PHYSICAL THERAPY

The Physiotherapy Review

Vol. X No. 5

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*King, J. Cash, and Cocke, Edwin W.: Therapeutic Fever Produced by Diathermy, with Special Reference to its Application in the Treatment of Paresis. South. Med. Jour., Mar., 1930.

See also Illinois M. J., LVI:3:203, Sept. 1929, "Artificial Fever Produced by High Frequency Currents—Preliminary Report." By Clarence A. Neyman, A.B., M.D., and S. L. Osborne, B.B.E.

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Folly of Authority

By Steele F. Stewart

It is a common failing of human kind to bow the knee before some potentate or king. In ancient days this homage was a physical affair, in later days when kings have become less popular it manifested itself as a worship of some hero or some authority. The law books and legal procedures are full of references to this case and that case, to this authority and that authority. Theology is almost entirely a reference to authority. Medicine through centuries referred to Hypocrates or to Celsus, and that same condition holds true today.

In no field is this reference to authority more marked than in the field of physiology as applied to physiotherapy. In no text book of anatomy that I have found, nor in any book of reference to muscle function that I have found, are the hamstrings, both internal and external, referred to as extensors of the knee joint, but if each reader here will place their foot on a chair and their hand behind their knee joint and then try to step up on the chair, they will become conscious at once of the fact that the hamstrings are powerful extensors of the knee. This comes about through the fact that they are acting between two relatively fixed points, the foot and the pelvis. By the same token the gastrocnemius also becomes an extensor of the knee, but both work in conjunction with other muscles.

There is no need for burdening you with a long discussion as to why this is so, or to what other muscles we might point which have a function entirely the reverse of that which is ordinarily ascribed, but we would call this to your attention in order that we may awaken in you the realization that your muscle physiology is by no means a finished product, so far as our knowledge of it is concerned, and that before you as observers and as workers there stretches a field the extent of which at the present time no one can conceive. It is up to you, the workers in physiotherapy to make your observations of these muscular activities and deficiencies, and to record them so that others may learn from you a new point of departure for further study.

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Poliomyelitis and Its After Care Treatment by Exercises in Warm Water

By LeRoy W. Hubbard, M. D., Surgeon-in-Chief, Georgia Warm Springs Foundation

There are no accurate statistics in regard to the number of crippled or physically handicapped persons in the United States, but from surveys made in various parts of the country it is estimated that there are at least 300,000. Forty per cent of these were the victims of poliomyelitis. From 5,000 to 10,000 cases are added to this list every year. The disease is endemic in every state in the Union, and in several states it assumes epidemic proportions nearly every year. Therefore, it is a disease to be reckoned with, not only on account of its high mortality, but because of the serious crippling conditions which it leaves behind in the majority of its victims. Pneumonia, scarlet fever, diphtheria, typhoid, and the other communicable diseases take a heavy toll of deaths, but those who recover are practically as well as they were before!

Poliomyelitis is not a new disease, as it was studied and written about in Europe as early as 1840, and serious epidemics occurred in Sweden, Norway, and Denmark all through the latter part of the nineteenth century. Sporadic cases must have occurred in the United States many years ago, for persons sixty and seventy years old have been found who had the disease in childhood. The first recorded epidemic in the United States was in 1899 in Eastern New York and western Connecticut, when more than one hundred cases occurred in a limited area. This was followed by outbreaks in New York City in 1907, western New York in 1910, '11, and '12, New York City in 1915, and in most of the States in 1916 when more than 25,000 cases were reported, and probably there were as many more of which there is no record. The State of Vermont had outbreaks amounting to epidemics, considering the population, as far back as 1894, and occurring practically every summer.

There is still much to be learned about poliomyelitis, but since 1916 certain facts have been established:

1. It is an acute infectious or communicable disease which may, or may not, cause complete or partial paralysis of one or more muscle groups.

2. It is caused by a specific micro-organism. There is some difference of opinion as to the form of the organism, but the majority of observers consider that it is ultra-microscopic and passes through a Berkenfeld filter unchanged. It has been grown in media outside the body and produced the typical characteristic symptoms in monkeys through a series of cases.

3. It enters the body through the nose and throat and is discharged in the secretions of the mucous membranes of these parts and possibly the intestinal track.

4. It enters the blood stream through the vessels of the cribriform plate of the ethmoid and attacks the meninges and the motor track of the spinal cord. The meningeal inflammation usually subsides early, and the principal damage occurs in the anterior horns of the gray matter of the cord.

5. The inflammation due to the irritation and poison produces swelling around the blood vessels and pressure upon the motor cells of the cord. If this pressure is sufficiently great and continues for some time, the motor cells cease to function in one or more locations, and paralysis of the muscles supplied with nerve force from these locations results. If the inflammation and pressure on the motor cells subsides very quickly no paralysis may result, if less quickly, but before atrophy or destruction of the cells has taken place, complete or partial recovery from the paralysis may occur.

6. It is known that healthy persons may harbor the organism in their noses and throats without contracting the disease. It is probable that the persons who are attacked harbor the organism for a few days before they show any symptoms and for a short period after the onset. During these periods they are potential sources of infection and may convey the disease to others. Probably the disease is spread more by healthy carriers and the non-paralytic type of cases than by those who are actually paralyzed. While the most common method of communication is from hand to mouth, the virus may be distributed by food, notably milk.

7. The disease is more prevalent in children under sixteen years of age, but there is no age limit, and in any outbreak of considerable size probably ten to twelve per cent of the cases will occur in persons over eighteen years of age.

8. From a study of several epidemics, comparing the number of cases with the number of children of susceptible age, it is believed that a considerable immunity against the disease exists. One authority, Dr. Harold Amos, states his belief that it is one to two hundred. Whether this immunity is natural or caused by light unrecognized attacks in infancy or early childhood is not known.

While there are cases on record of paralysis of one or more muscles without recognized previous symptoms, in the vast majority of cases the attack is ushered in by distinct symptoms of acute illness. These symptoms are similar to those of the other infectious communicable diseases; viz., headache, vomiting, rise of temperature and pulse, and general malaise. The symptoms which distinguish poliomyelitis from the other diseases are stiffness at the neck, which may be only slight, frequently pain in that region or upper back, sweating around the neck, and tremor. The general appearance of the patient also is that he is much more ill than the temperature and pulse record would indicate. A positive diagnosis can be made by drawing off some of the spinal fluid and examining it under the microscope for increase of cells.

Poliomyelitis, therefore, may be defined as an acute infectious disease which is frequently followed by flaccid paralysis of one or more muscle groups.

If paralysis is to occur, it usually comes on within two to five days after the onset, but may be delayed a week. It may be complete or partial, and affect only one muscle or practically every muscle in the body. Death always is the result of paralysis of the muscles of respiration, and usually occurs within five days after the onset, though I have seen it delayed for two weeks. The fatality rate varies from ten per cent to twenty-five per cent in different epidemics. In a camp in Vermont last year there were five cases among boys about sixteen years of age, and four of them died.

While there are some cases with well defined paralysis which will recover partially, or even completely, without any treatment, or in spite of bad treatment, and in other cases there will be so much destruction of the motor cells permanent paralysis will result in spite of the best treatment, on the other hand, in the majority of cases, the end result will depend largely upon the treatment.

Two main principles are to be borne in mind in the treatment of a case of poliomyelitis. First, an attempt to reduce as much as possible, quickly, the inflammation in the cord to prevent destruction or atrophy of the motor cells. Second, preservation of muscle tissue and restoration of nerve function by means of directed exercises and muscle re-education.

The first principle applies so long as there is any evidence of inflammation, as indicated by pain and muscle tenderness, and until the usual, natural, unaided return of power occurs in some of the muscle groups. This period may last a few weeks or several months, but rarely in any case, except of the mildest type, should active treatment be started under three months. The most important thing in the early and convalescent stage is *Rest*, and this should be written with a capital R and underscored. Rest does not mean simply keeping the patient in bed, but lifting him, changing position frequently, bolstering him up with pillows, and moving the paralyzed limbs about in attempts to get motion. Rest means lying in a bed, which should be smooth and firm, with only a very thin pillow under the head, and only enough movement and change of position to keep the skin in healthy condition and relieve fatigue. All other treatment is symptomatic and varies with the individual case. The limbs should be supported with sandbags or light splints to prevent deformity and stretching of the weakened muscles. If the arms are involved they should be kept away from the body by pillows or slings to the head of the bed to prevent contractions.

Not infrequently, the pain in the joints is so great that it is necessary to allow the limbs to remain in the most comfortable position, even though contractions result. These can usually be corrected later. Often the pain is so severe in the back and limbs that morphine is required for several days. Hot packs or the application of heat to the spine in other ways often relieves the pain and may help to reduce the inflammation. Massage should never be employed as long as there is any pain or muscle tenderness, and then only very light in character. The muscle fibres are soft and friable at this time, and instances are on record where almost complete destruction of the muscle has taken place from too vigorous massage.

In order to carry on an intelligent plan of after care treatment by means of exercises and muscle training, it is necessary to determine, first, what muscle groups are involved and to what extent. Mechanical devices have been tried to determine muscle force by the electrical current, or the spring balance, but the most practical method is the manual grading by the operator.

Some examiners employ numbers, but at Warm Springs we have continued to use the gradings originating with the late Dr. Robert W. Lovett with some modifications. These are six in number: O; indicating that no effort of the patient's will can produce the slightest contraction of the muscle. Trace; where the muscle contracts, but not enough to produce motion. Poor; movement through a complete arc, but not against any resistance. Fair; movement through a complete arc against resistance, and ability of the muscle to sustain weight. Good; movement against strong resistance, and ability to sustain weight against pressure, but not normal. Normal. In addition, we use plus and minus signs to indicate force midway between the standard gradings. It is necessary to take into consideration the age and general physical condition of the patient before the attack.

While this method is not absolutely accurate, and the findings will vary somewhat among examiners of equal experience, it is sufficiently reliable for practical purposes.

The object of the exercises is not general haphazard movements of a whole part, but definite, controlled, and mentally directed movement of the individual muscle groups, based on their anatomical relations and normal physiological action. Each exercise should be given very slowly, as it requires complete concentration on the part of the patient. The maximum number for each muscle group should not exceed ten, and this should be reduced if there is the slightest sign of fatigue. The last exercise should be performed as well as the first. When the muscles grade only zero or trace it is necessary for the operator to carry the part through the movement, at the same time directing the patient to make the effort to produce motion. A persistent daily trial over a considerable period of time will, not infrequently, result in actual movement.

In the majority of cases the exercises are given most effectively, where the water exercises are not available, on a solid table, with a smooth firm surface, and in the prone position, or lying on the side. They should be given not more than once a day, and one day's rest a week is advisable. An appreciable interval should occur after each exercise, so that the patient may be able to concentrate his thought and deliberately attempt to repeat. Counting aloud is very helpful in maintaining regularity and rythm.

During and following the epidemic of 1916 a rather routine method was carried out among children by placing them in a bath tub of rather warm water to which salt had been added. The special object was relaxation of the muscles and stimulation of the circulation. But it was soon found that these children could move their arms and legs more freely in the water than outside. Also, it was observed that the older patients who were not severely affected, who went for the summer to places where they could swim, improved must faster than they did before. Therefore, the method of after care treatment by means of exercises in warm water was developed, and during the past five years has been adopted in many parts of the United States. Hospitals and schools for crippled children have put in pools equipped with special apparatus for exercises.

The method is perfectly logical. The object of after care treatment is to obtain as much exercise as possible without fatigue. Patients who become fatigued after twenty minutes or half an hour's exercise on a table can exercise from three-fourths of an hour to an hour or an hour and a half in the water and do not feel tired. The buoyancy of the water sustains weight, and as friction is practically eliminated, the weak muscles are able more easily to perform all the functions they are capable of performing. Also, many exercises are possible in the water which cannot be done satisfactorily on a table. This is particularly true of exercises for the trunk muscles.

The size of the pool depends upon whether it is to be used for a single patient or a group, and also upon the expense of construction and operation. In most places in the United States, in order to operate through the entire year the pools must be indoors, and the water

artificially heated to a temperature of 85 degrees to 90 degrees. At Warm Springs we have a great volume of water which has a constant temperature of 89 degrees winter and summer. This water also is heavily mineralized, is therefore more buoyant than the usual fresh water, and the patients can remain in it a much longer time without any depressing effects. Recent tests have also shown that it has some radio activity, but I do not know whether this adds to its value or not.

We have two exercise pools, one seventy-five by twenty-seven feet, which is open and used in summer time, the other eighty-two by thirty-five feet, glass covered and heated, which we use in winter and on rainy days in summer.

If the pool is to be used for exercises, apparatus of various kinds is necessary. The most important is a table, or tables, fastened to the bottom of the pool, the top being about twelve to fifteen inches below the surface of the water, and bars parallel to the side, extending four inches out and just below the surface of the water. To these may be added with advantage, a chair for arm exercises, parallel bars for walking, and swinging rings. If the pool is small a narrow platform attached to the side of the pool may take the place of the table.

The most satisfactory depth of water for operation is four feet to four feet, six inches. At Warm Springs the tables are six feet long two feet wide, and the tops are made of cypress, which stands continual submersion better than any other wood. The depth of the water above the table top is 12 to 15 inches, and at one end there is a raised portion to support the head and shoulders out of the water. For some of the more badly paralyzed patients canvas straps with rings at each end are necessary to hold them on the table, and for some an assistant is required.

The specialized exercises require from twenty to forty-five minutes, according to the amount of involvement, and after their exercises the patients are allowed to go into the playpool, which is connected with the exercise pools by a water passage way, and each one is taught to swim by an instructor especially trained to teach the handicapped. The only satisfactory way to give the exercises is for the physiotherapist to go into the water and stand by the table. Working from the side will not accomplish the result as well.

Since 1907 I have devoted my time exclusively to the after care treatment of poliomyelitis patients by means of exercises and muscle re-education. For ten years I was in charge of the work in New York State, under the State Department of Health, and had under my supervision several thousand patients. I followed these cases from year to year under the best method of treatment known, and from my experience during the past three years, I am convinced that the majority of patients will improve more and quicker with the water exercises than by any other method. This is especially true for the adult and adolescent patients, for whom until quite recently, not much could be done. They are the ones who need quick rehabilitation and adjustment most. Children gradually become accustomed to their handicap, and by the time they have grown up have already adjusted themselves to it.

One great advantage of the water exercises is the fact that the patients enjoy them, and each day are eager to go into the pool, while daily routine exercises on a table soon become a bore. The difference in mental stimulus is the same for these patients as for the normal individual who gets exercise by playing tennis or golf instead of doing a daily dozen alone in his room. In my opinion this mental attitude is an important factor in the result.

Spastic Paralysis

By Charles Peabody, M. D.

I have chosen this subject of Spastic Paralysis to discuss with you tonight for two principal reasons. The first is that it is one of the less attractive fields of endeavor for the efforts of either the orthopedic surgeon or the Physiotherapist, and on that account probably a subject that you have heard less of in these meetings than of many others. The second reason is that in my experience it is less well appreciated and understood by the Physiotherapist than almost any other condition commonly treated, and possibly on this account, there has been more wasted effort and ill-advised application of the various modalities of treatment.

If I can assume these two propositions to be correct I will have justification for taking a little time in reviewing with you the nature of this disorder we call spastic paralysis. Medically speaking it is set apart from the other large group of paralyses by the designation of "an upper motor neurone lesion," which accounts for the element of spasticity; with the lower motor neurone lesions having the characteristic of flaccidity. The difference in effect is due, as you recall to the fact that the spinal cord constitutes a relay or transfer point for nerve currents passing both downward and upward. Our muscles are maintained in state of moderate tone or tension, through the mechanism of a reflex arc or circuit, which is independent of any connection with the brain, and is the result of a constant flow of nerve currents from the extremities upward into the spinal cord and through the relay point there down again to the muscles. The so-called knee-kick or knee-jerk is an example of this reflex phenomenon, and is produced when by a tap of any particular tendon, the state of tonus in the muscle is suddenly and abruptly changed, and a counteracting short contraction of the muscle follows in the space of a split second. When accident or disease interrupts the normal paths of communication between the spinal cord and the higher nerve centers in the brain this reflex response becomes greatly exaggerated.

This last point then bears directly on the functional disturbance seen in spastic paralysis, for there are several different nerve pathways which conduct activating currents from the brain centers to the muscles. Some of these transmit to the muscle to be activated, the effort current generated in the brain by the will to effect a particular movement or motion. Others carry a current partly of a steadying or harmonizing character, and partly of a negative character, so that when we put into action, for instance a group of extensor muscles, the opposing flexors receive a diminution of their normal balancing tension so that they will relax. In the absence of these involuntary currents of nerve impulse from brain to muscle, coordinated effort becomes difficult or impossible; and in the absence of any currents reaching the spinal cord from the brain, conscious effort or will cannot ever be translated into responsive movement of the extremities, even though the muscles continue firm and hard and in a good state of development and tonus, and respond vigorously to reflex or peripheral stimulation.

Keeping this last fact in mind we can divide all cases of spastic paralysis into two groups, sharply separated from the angle of physical treatment. In one group fall those spastics who have sustained from accident or disease a complete interruption of communication between the spinal cord and the motor areas of the brain. The three most frequent conditions falling into this group are spinal cord injuries, spinal cord tumors, and the spastic paraplegia residual when Pott's Disease has destroyed the spinal cord. May I presume to remind you, in passing, that this type of paralysis cannot possibly be influenced to the slightest degree by any modality of physical therapy, however alive and responsive the muscles seem to be to local stimulation. Of course the orthopaedist can often obtain for the patient a certain type of locomotion by the Tripod Method; the limbs being used as props or like artificial legs, after braces are applied and deformities corrected. The physiotherapist may sometimes be of great service in the accomplishment of the latter but of course the paralysis is unaffected and unmodified. It is true that not all spastics with the three diagnoses given above have sustained a complete interruption of connection between the spinal cord and the motor areas in the brain; and in such case they belong in our second main group.

This other group constitutes most of the spastics that are treated, in whom the common factor is a varying degree of disturbance of the various nerve pathways between the higher brain centers and the spinal cord. This disturbance is the result usually of one or more of three lesions of the central nervous system, namely, inflammation (as from encephalitis) hemorrhage, and pressure atrophy. The majority have a congenital origin, that is to say, occurring at or before birth, and this group unfortunately show to varying degree an impaired mentality up to complete idiocy; but we must remember that in the children the mentality is often retarded rather than absent, and that there is no very consistent parallelism between the degree of spasticity and the mental capacity. This is particularly true of the hemiplegics, i. e., the unilateral cases.

The effect on the extremities of the damage in the central nervous system through impaired coordination, impaired automatic inhibition, and over-stimulation is either (1) an athetosis, i. e., purposeless movement, or (2) rigidity with the limb in functioning position but movement difficult through inability to accomplish the necessary relaxation of one of two opposing muscle groups, or (3) preponderance of tone of part of the muscles, which maintain the limb in a non-functioning position or in a postural deformity.

Now with this background of the pathology and mechanism of spastic paralysis let us examine our various modalities of physical therapy from the viewpoint of their applicability. These may be grouped as (1) heat (2) massage (3) electrical stimulation and (4) exercise, including active and passive motion.

Beginning with heat we can assume that its therapeutic effect lies principally in producing local vasodilatation. with resulting increase in local reparative processes and increased muscle power from better nutrition. Obviously there are no pathological changes in the joints to combat in spastic paralysis, there is no inflammation

or disturbance in the nerves of the extremities, and there is no wasting or degeneration of any of the muscles, which on the contrary are overdeveloped and overactive. Accordingly it would seem apparent that this modality of heat has no useful place in treatment, but may on the other hand by bringing in an over-supply of blood, increase the already abnormal excitability of the muscles that are so difficult of control.

Turning to massage we have an agency that mechanically increases the circulation, arterial, venous and lymphatic, and so aids in repair and regeneration through better nutrition. As we have no local deficiency in these respects in spastic paralysis we can expect no benefit as a rule from its application. However, it occasionally develops that an overactive uncontrolled group of muscles may have maintained for so long a position of deformity that the antagonist muscle groups may have been overstretched and somewhat deteriorated. In this instance massage, if selective and carefully localized to the appropriate group, may aid, after correction of deformity, in restoring a balance. On the other hand massage if generalized will disproportionately increase the overcapacity of the dominant and unrestrained muscle groups and actually make matters worse.

As to electrical stimulation much the same reasoning applies as in massage, and it is usually even more difficult to control and localize upon those muscle groups which have given way to their stronger antagonists. It is also questionable whether occasional artificial excitation of these normal but overbalanced muscle groups will have any permanent effect toward reversing the preponderance of tone and central overstimulation.

It is on the modality of exercise that we have to depend for any beneficial effect by physiotherapy, and I would like to emphasize the point, that, when properly applied and kept up over long periods in spite of an often prolonged and discouraging lack of evidence of improvement, it does offer a means of rehabilitation, with or without the combination of surgical measures, of individuals otherwise certain to continue in a state of more or less crippling disability. The successful accomplishment of a difficult movement, repeated over and over again, either through passive assistance, actively at commands bringing out the maximum concentration of mental effort, or through the power of rhythmic repetition, will in the end bring the movement more and more under conscious and volitional control.

In the simplest passive movement we find that extremely important resource for overcoming the shortened state of the overactive and hypertonic muscle groups, and by forcibly stretching the same we not only rest and relax their fatigued antagonists, but actually produce a temporary fatigue status in the reverse direction which may allow a period for return of volitional control. This passive motion must not be jerky or it will defeat its own ends, but on the contrary very gradual, starting with a minimum of force, but as the muscle lets go, increasing steadily to the maximum which the patient can stand, maintaining the overcorrected position for several minutes, and equally important, finally letting up with just as gradual diminution of pressure.

Passive motion of course goes over with no sharp dividing point into aided active motion. This combination is very useful, and particularly in those cases with a major difficulty of coordination, and can be accomplished also by mechanical devices producing a rhythmic repetition of the most elementary or isolated movements. The simplest, and a universally applicable device, is that of the pendulum, when the extremity is attached to a suspended weight in such a way that the greater part of its arc of motion produces movement in the desired direction. As the impetus of the pendulum gradually slows down the patient is encouraged to make increasing effort to keep it swinging.

Purely active supervised motion is depended upon where the desired simple movement can by concentration be accomplished, but only with such difficulty that the patient is unlikely to make the effort without supervision or moral suasion. From the simpler active motions we pass to more complicated ones, using for the upper extremities, games and toys with the smaller children, and occupational therapy with the larger ones. For the lower extremities, stationary bicycle riding, locomotion in a rolling walker, walking between hand rails, obstacle walking (as through a flat ladder), marching and finally dancing, constitute the exercise program.

Exercise work in spastics is re-educational and aims by dint of concentration and repetition to bring about use of the undamaged nerve pathways in a compensatory or substitutional way for the damaged ones. Just as in most individuals the higher centers are susceptible of development by education for intellectual capacity, so are they also capable of achieving unusual capacity for overcoming pathological handicaps in coordination.

It is true that we are more or less restricted in our accomplishments with spastics by the mental retardation factor, and of course can get nowhere with the imbecile. But we all have been impressed by the fact that mental improvement usually is tremendously stimulated by peripheral rehabilitation and have seen many rather hopeless appearing children develop in most surprising fashion as their capacity to get around and do things is improved.

I would like finally to take just a few minutes to mention some of the means of treatment of spastics of surgical character. You are familiar of course with the utilization of brace apparatus to help in control of the unruly parts, and the assistance which these provide in the program of re-education. In addition then are many valuable surgical procedures. A persistently ungovernable muscle is often more of a handicap than would be its complete absence, and so we occasionally resect a tendon and put the corresponding muscle out of action. Shortened muscles sometimes require tendon lengthening, but as a rule this is avoided, since when the tendon is lengthened the muscle becomes shorter and often picks up the slack, becoming even more rigid as it contracts. This procedure is usually the most successful in the hamstrings, and often gives an overburdened quadriceps group an opportunity to get the upper hand again. We sometimes transfer the attachment of an overactive muscle group that is having a vicious effect to a point where its activity will be reversed. But probably our most valuable surgical procedure is that directed upon the nerves of the extremities. This is not because these nerves are abnormal, but because they are permitting the passage of an abnormal amount of stimulation. In some cases we completely resect a nerve and paralyze the ungovernable muscle; the typical example being the obturator nerve resection, which puts out of action most of the adductors of the thighs, and so by eliminating the scissor gait and permitting a wide base of support, will alone make possible any locomotion at all. We sometimes paralyze temporarily a bad acting muscle by crushing its nerve, so that in the intervening period effective re-education of the opposing muscle group becomes possible. And finally we can divide a nerve cable up into its constituent fibres, removing enough in the given case to prevent overstimulation by the reduction in the total number of fibres.

None of these surgical procedures however is enough if it cannot be followed up by re-education; and once again, in the field of spastic paralysis, the orthopaedic surgeon would accomplish very little without the services of the trained physiotherapist.

571 Fisher Building, Detroit, Mich.

Statement of the Ownership, Management, Circulation, Etc., Required by the Act of Congress of August 24, 1912

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of THE PHYSIOTHERAPY REVIEW published bi-monthly at Mount Morris, Illinois, for October 1, 1930.

State of New Jersey } ss.
County of Essex }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Dorothea M. Beck, who, having been duly sworn according to law, deposes and says that she is the editor of THE PHYSIOTHERAPY REVIEW and that the following is, to the best of her knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

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DOROTHEA BECK.

Sworn to and subscribed before me this Sixteenth day of October, 1930.

(SEAL) ERLAND M. NELSON.

(My commission expires April 8, 1932.)

Reconstructive Objectives in the Treatment of Scoliosis

By Vernon P. Thompson, M. D.

A short discussion of this subject is necessarily inadequate yet may be suggestive enough to stimulate thought. The different opinions concerning the problem of scoliosis and the varied modes of treatment meet on the common ground of seeking to help the patient. After careful study and analysis has clarified the nature of the condition present, the parental query "can you do something for it" must be faced. In view of the general pessimism felt regarding scoliosis engendered by forcible attempts to obtain correction of the curve as seen in the X-ray, or to maintain apparent correction with or without fusion operations, one may say with some truth that there is a great deal to be done to it but little for it.

Study of the pathologic anatomy and mechano-dynamics of scoliosis has served to focus attention firmly on the permanent bony deformity. Humanely enough, the unattainable has been the most sought for. It is strange that a mechanical ideal, as yet unattained, has obscured the physiological ideal of adequate function. Yet a moment's consideration shows that the mechanical ideal is a useful working goal only as it may lead to the physiologically sound result.

Mobilization, correction, and maintenance. Hoffa's three principles of the treatment of scoliosis, are not objectives to be gained as such, but phases of treatment necessary to achieve the desired result. Mobilization is of value only as it aids correction and permits the formation of compensatory curves. Many workers are well aware of the danger of increased slump following unwise mobilization. The uselessness of correction without adequate maintenance is all too clear when relapse occurs.

Difficult as correction of a given case may be, restoration of balance after fusion operation is doubly hard. The green, living bone of the fused spine gives it increased stability. But living bone will bend. The slump inevitable without active maintenance becomes pepetuated in the operated region. Nature, through gravity and faulty body mechanics, will take years to increase the deformity until art is unable to cope with it. Do not be deceived by the brittle rigidity of a dried specimen of fused spine. Examine one freshly removed and note its flexibility. Massive grafts of dead cortical bone are, of course, quite rigid until revascularized. But this type of fusion can be carried out over but relatively small areas and so is less frequently used than the Hibbs type of fusion.

Steindler's analysis of why some cases become stationary while others progress clearly demonstrates the importance of the principle of compensation. Whether adequate compensatory curves are established spontaneously or by treatment, improved body balance is the result. The ideal line of gravity falls neither off center laterally nor is it misplaced antero-posteriorly. The importance of balance is not generally appreciated. Balance is too much regarded as a static affair as though the body were merely a segmented inanimate object. Rather, it is essentially dynamic in character when considered in relation to the human body, constantly moving, with unique problems of postural maintenance that no other animal has.

The dynamic aspect of balance becomes clear when the complex neuro-muscular mechanism with its primitive postural patterns, evolved through the ages, necessary for postural maintenance, is considered. Herein lies a good part of the story of failure with the treatment of scoliosis. The insurmountable mechanical difficulties presented by the bony deformity, with the almost equal difficulty presented by the contractural element of scoliosis, have clouded the essential issue. Forcible correction has presented improved spines as seen in the X-ray, some apparently held a year or so after spine fusion operations, but chest compression, relapse, and increase slump have been discouraging. Thus, correction must respect chest capacity. Efforts to utilize the ribs as levers to correct spinal deformity has demonstrated that the levers give way before much vertebral correction is gained. During the months of correction, the patient should be taught maintenance exercises, so that over an increasing proportion of the time the patient can be expected to hold himself even better than the apparatus enforces. In this way, active maintenance is gained, such support as needed being applied as long as necessary.

The importance of reserve chest capacity, with plenty of room for heart and lungs and upper abdominal organs, with properly functioning diaphragmatic and abdominal muscles as the physiological goal of adequate function is rarely stressed. Is it not plain that this is the machinery on which the body's health depends? Is all the work of treating these cases merely to make them look better? While a good cosmetic result may be a good physiological one, sound practice will consider, first and last, this ultimate aim.

Los Angeles, Calif.

Diathermy in the Treatment of Postoperative Adhesions

By Charles Fulmer, M. D., X-Ray and Physiotherapy Departments, St. Lukes Hospital, San Francisco

Abdominal adhesions are the cause of suffering to the patient and worry to the surgeon. The operation may have been performed with the greatest skill and yet the patient suffers as much from adhesions as he did from the original disease. The patient keeps returning to the doctor, seeking relief only to be told that there is no cure for adhesions. Occasionally the patient is reoperated to free some of the worst of the adhesions but rarely does this effect a cure. In most cases the patient is doomed to years of more or less periodical suffering. Usually the patient is put to bed during the acute attacks and some form of heat is applied. Some analgesic drug is given to deaden the pain and decrease the spasm. Morphine is frequently given but it is avoided if possible because of the chronic nature of the disease. In many cases hot water bottles and hot stupes have little or no effect on the pain. However heat and rest play an important part in the treatment.

In order to produce heat at the source of trouble we have been using diathermy. In our hands it has shown itself to be the most efficient method of applying heat. In the average case the through and through method seems to give the best results. Two large block tin electrodes are used. One is placed on the front and one on the back over the seat of trouble. The current is slowly raised to about 2000 M.A. and is continued for about one-half hour. Then the current is slowly decreased. The treatments are given at 24 hour intervals for the first five or six days. By this time the patient is usually improved to such a degree that the treatments are only required about three times a week. Before the patient has received ten treatments he is usually free from pain. Rest in bed between treatments is a decided advantage and for that reason it is best to hospitalize the patient in all but the mild cases. Often the pain is relieved during the first treatment but returns worse than ever three or four hours later. Usually the patient feels much better by the next day and from then on shows a steady improvement. Some cases do not get relief until after the third treatment and others are free from pain after the second treatment. It is advisable to continue the treatments on alternate days until ten are given even if the patient is free from pain. If a course of treatments does not produce definite relief it is useless to continue as the case is not one of simple adhesions.

Painful adhesions following the drainage or removal of the gall bladder usually respond after the second or third treatment. Pelvic adhesions are more resistant as a rule but usually respond after a few treatments. In cases of adhesions of the bowel which cause signs of obstruction the treatment is surgery and not diathermy.

Of course diathermy does not remove the adhesions but it does relieve the acute attacks of pain and decreases their frequency. This is more than any other line of treatment has to offer. If used in the onset of the attack, diathermy will often give almost immediate relief.

Probably most of the pain is caused by a spasm set up by the irritation of the walls of the bowel. By heating the abdominal viscera we decrease the spasm and lessen the pain. When we give a diathermy treatment the high frequency current passes through the walls of the abdomen and then through the walls of the bowel. If the intestines are matted together the current will find the path of least resistance to be through the bands of adhesions. In passing through the adhesions some of the electrical energy will be transformed into heat which is exactly what we want. The heat has a soothing effect on the inflamed viscera and produces a vaso dilatation with a corresponding increase in blood supply. It is the sedative effect of the heat that causes the early relief of pain and the increased blood supply that causes the lessened frequency of the attacks.

Diathermy may be of use in gallstone colic to tide the patient over an acute attack in cases where surgery is not advisable. There does not seem to be any decrease in the frequency of the attacks following the use of diathermy in these cases. Of course diathermy should never be used in gangrene or acute infections of the gall bladder.

In some cases of pelvic adhesions following operations on female pelvic organs it is advisable to use a vaginal electrode for one pole and the abdominal electrode for the other. In most cases the regular large tin electrodes placed front and back give the best results.

Electro-Physics

By K. Wilhelm Stenstrom

Read before the American Physiotherapy Association, Detroit, Mich., June, 1930

It is of importance that any person who applies electric current for treatments knows how the current acts. He is less apt to make mistakes if he really understands the underlying principles. Let us now start from the beginning and build up a simple and useful structure from which we can arrive at definite conclusions concerning a number of details without having to memorize all these details and to which we can attach our experiences.

The old comparison between electricity and water seems to be very useful. We must have in mind, however, that we have two kinds of electricity which have been referred to as positive and negative. If we have just as much of one kind as of the other and mix them together they will neutralize each other, so that we get the impression that they have disappeared. Just as water can be poured into a container, so the electricity (whether the positive or the negative) can be poured on to an insulated piece of metal. If there are holes in the container the water will run out; if the piece of metal is not insulated well, the electricity will leak away following conducting parts to the ground. The amount of the water in the container is equal to the cross section times the height of the water. The amount of electricity on the metal is equal to the capacity of the metal piece times the electrical potential. The potential, therefore, corresponds to the height of the water or the pressure of the water. We usually have to do with differences in potentials and measure these with a unit that is called a volt. If one container filled with water is connected with an empty container by means of a pipe the water will run into the empty container provided this container is not at a higher level than the other, and it will run until the two water levels are at the same height above the earth. So the electricity will run from one metal piece to another if they are connected by means of a conductor and run until the voltage is the same on both pieces. Conductors will therefore correspond to channels or holes through which the water can run, and an electric current corresponds to a stream of water. Please observe the difference between electricity and an electric current.

Conductors

We have metallic conductors, electrolytic conductors and insulators, and also good and poor conductors. In the metal wires the current runs very easily. Very, very minute particles with a negative charge (electrons) move along inside the wires. They run from the lower potential to higher potential. The potential can also be negative and a potential—10 volts is of course lower than—1 volt. We usually say that the electric current runs from higher to lower potential, but the particles being negative really move in the opposite direction. Water runs easily through air but air is usually an insulator for electricity. Dry wood is an insulator, so is porcelain glass, paraffin and oil. Water is an electrolytic conductor. That means that the electricity is carried through it not by electrons but by somewhat larger particles, ions, and carried in both directions; by negative ions in one direction and by positive ions in the opposite direction. There are just as many positive as negative ions transporting the electricity. These ions do not move as easily as the smaller electrons and the electrolytic conductors are, therefore, not as good conductors as the metallic. Real pure distilled water contains relatively few ions, and is therefore a particularly poor conductor. If salts are dissolved in water they are split up into ions and increase the conductivity. That water runs rather slowly in pipes or in river depends upon the friction between the water particles against one another and against the walls or bottom. So we think of the electric particles overcoming friction in the conductors. We refer to this friction as resistance. The higher the resistance the more difficult it is for the particles to travel along. We also know that where there is friction between moving bodies, part of the energy is transformed into heat. So also when electricity runs through a resistance heat is produced. The resistance is larger the smaller the cross section of the conductor and the longer it is. It, however, also depends upon the material. Iron, e.g. is much poorer conductor than copper and that is the reason why copper is used to so great an extent as a conductor. Silver and gold are still better conductors but too expensive to be used as a rule. The resistance is measured in ohms. The electric current (the amount of electricity passing through the cross section of the conductor per second) is measured in amperes and we have the very simple relation in a piece of the conductor that the voltage between the ends is equal to the amperage times the ohmage $V=A\times\Omega$ (Ohm's law) and the heat produced in a resistance is equal to $V\times A$ or $A^2\Omega$ (Joule's law.)

Different Kinds of Currents

We have so far considered current traveling in the same direction all the time. Such current is referred to as direct current (D. C.). If the intensity of the current is the same all the time, then we have constant direct current. If the intensity is varied, we have variable D. C. and if it is interrupted with frequent intervals of time, then we have interrupted D. C. Galvanic current is D. C.

We also have current that runs first in one direction and then in the opposite direction and so on. This is referred to as A. C. The simplest form of the alternating current is the sinusoidal which shows a continuous change in intensity from zero up to a maximum down to zero, then below zero (which is the same as going in opposite direction), then reaches a minimum and comes back to zero. One such complete change as described is called one cycle. Current with almost any number of cycles per second (of any frequency) can be made. The most common is the 60 cycle current, which is used in most cities. Sometimes 25 cycle current is used, e. g. the Niagara Falls system. If we tried to measure the intensity of such current with a D. C. meter it would register 0 all the time because the needle is too slow to

follow the variations and just as much current is going in one direction as in the other (or just as much negative as positive intensity). We must use meters that sum up the negative and positive, and the A. C. meters do that. They register what is called the root mean square of current. The maximum intensity is equal to $\sqrt{2}=(1.41)$ times this value. The voltage fluctuates in a similar manner as the current and the root mean square of the voltage is usually measured. Most city lines carry 110 volts but one has to watch out for the voltage as well as for the cycles. Before connecting any electrical apparatus one has to be sure that the apparatus is made for the voltage and for the type of current on the line; whether it is D. C. or A. C. and if A. C. whether it is 60 cycles or 25 cycles or of any other frequency. One must also ascertain that the line and the fuse are heavy enough to carry the required current (amperage).

The current used for broadcasting is of very high frequency. It has a very great number of cycles per seconds 1,000,000 or more. The current used for diathermy is very similar with a frequency somewhere between 300,000 and 3,000,000.

Sometimes a current is used which does not charge smoothly and continuously as the sinusoidal. The faradic current e. g. just supplies sudden impulses which last for a very short time with longer intervals in between.

CURRENTS THROUGH TISSUES

Tissues are built up from membranes and fluids. The membranes are every poor conductors while the fluids are good conductors of the electrolytic type. The electricity is therefore transported by ions. Ions on the other hand are quite active chemically and it is, therefore, easy to understand how an electric current passing through the body can produce chemical changes. The direct current is being used for the so-called ionization therapy. If metal electrodes are applied to two places on the body, negative ions will be slightly concentrated near the positive electrode and positive ions near the negative electrode when D. C. is used. It has been assumed that metal ions could be pushed from a salt solution on the positive electrode into the tissues. They will not be pushed very far, however, because they will be bumping against other positive ions, e. g. hydrogen ions which can carry the current just as well and it would take a long time for the metal ions to travel an appreciable distance. Besides, only certain ions can pass through the cell membranes. Ionization with D. C. is therefore suitable for superficial ulcers only where the ions have to be transferred a short distance and membranes do not interfere. A. C. will make the ions first in one direction and then in the opposite direction. The initiation of such movements evidently has a stimulating effect on nerves and muscles. The more sudden the change of current intensity the more intense the stimulation. Such current can, therefore, be used to produce muscle contractions. Both the smooth sinusoidal current and the abrupt paradic are used for treatments of muscles and nerves. Some machines on the market are so constructed that the frequency, the form of current and the intensity can be regulated over a wide range and the number of stimulation per second can be selected to suit the individual case. The more the number of changes per second is increased the shorter the distance the ions move and the greater the amount of current needed for a certain stimulation effect. When the frequency becomes very high they, (the ions) will not move far enough to change positions and no stimulation or chemical effect is produced, but simply a heating of the tissues. The low frequency has to be over 10,000 in order that this result may be obtained. The low frequency current also produces heat in accordance with the law $H=A^2\Omega$. 0.24 $A^2\Omega$ calories per second. However, the amount of low frequency of D. C. which can be passed through the body safely is small because the chemical and stimulating effects become intense enough to cause death even with a very moderate current. The high frequency current, on the other hand, is limited simply by the amount of heat the tissues can stand.

PATH THROUGH TISSUES

If a current passes through two resistancese which are in series the greater resistance is heated the most as $H=A^2$ and the current is the same in both. The voltage drop is greater in the higher. If the two resistances are in parallel the current is divided between them and most will pass through the lower resistance as $\frac{A_1}{A_2}=\frac{\Omega_2}{\Omega_1}$ but notice that some current will pass through the higher resistance. The lower resistance will be heated the most.

If the two electrodes are applied to the skin at different parts of the body the current has to pass through both the skin and the underlying tissues, (resistances in series). The skin and adjacent fat has a high resistance and is therefore heated proportionately more. Most of the current passes straight through the soft tissues because the resistance there is low. Some current will spread out sideways but as this current has a longer pathway the resistance is greater and consequently the density of the current will be smaller. A very small portion of the current passes through the bones, which have much higher resistance than the surrounding soft tissues (resistances in parallel). The voltage has, as a rule, nothing to do with the pathway of the current but a certain amount of voltage is needed for a certain amount of current as we have $A=\frac{V}{\Omega}$. The conditions are a little more complicated when high frequency current is used as it is depending upon capacity and induction as well as upon resistance. As a consequence it passes through skin due to condenser effect much easier than other kinds of current. The "effective" resistance of the skin to such current is at least 10 times less than what it is to other currents. However, it (the skin resistance) is still higher than that of the soft underlying tissues.

DIATHERMY

Let us discuss diathermy treatments a little more, as they have been misunderstood in the past. The high frequency current from the diathermy machine passes through the tissues very much like other types of currents. It does not follow along the surface of the body and the so-called skin effect does not need to be considered at all. The skin effect applies to the passage of high frequency currents through metallic conductors but is negligible in electrolytic conductors for frequences below 3,000,000 anyway. The amount of heat produced in the tissues is equal to the "effective" resistance times the square of the current. The temperature increase depends upon to what extent the heat is carried away from the place where it is produced. At the skin, evaporation and air currents keep down the temperature and inside the tissues the blood circulation keeps it down. How effective the blood circulation can be in this respect was demonstrated beautifully by Binger & Christie when they applied diathermy to the thorax of dogs and measured the temperature of the lungs and rectum. As the treatment continued the rectal temperature increased to about the same extent as the lung temperature until the blood circulation to the lungs was reduced by clamping the blood vessels; then the lung temperature came up very rapidly. When heating a patient it usually is safe to use 10 to 20 m. a. per square cm. of the smallest electrode. Mr. Hemingway has recently made careful measurements

of the diathermy current and its effects and I wish to mention some of his results: The heat produced is equal to $A^2\ \Omega^1$ where Ω^1 is the "effective" resistance (series resistance). The voltage does not need to be considered in this respect. When electrodes are used which are made from porous material soaked in salt solution the concentration of this solution should be stronger than 1 per cent in order to make the resistance low enough. This type of electrodes cools off the skin as a consequence of evaporation. The resistance between the electrodes as used during treatments were found to lie between 25 and 200 ohms. E. g., the resistance in the region of the right shoulder of a patient before the treatment when 9x16 cm. lead foil electrodes (one anteriorly, the other posteriorly) and 1100 m. a. were used was 38.5 ohms. The resistance to 1,000 cycle current measured at the same occasion was found to be 600 ohms. The resistance to the low frequency current depends to a great extent upon the contact between the electrodes and the skin and upon the condition of the skin and decreases as perspiration sets in. The high frequency current resistance does not vary nearly as much but it is, of course, important to see that the contact is as good as possible, otherwise a burn on the skin will result from sparks. Measurements of this type give us the facts about the behaviour of the current and if we know these facts the treatments can be given more accurately and guesswork can be eliminated.

It seems worth mentioning in this connection that the general body temperature is as a rule not increased when local diathermy is applied unless the patient is very well covered. It is, however, possible to raise the body temperature as high as we wish if very large electrodes are used and the patient is covered completeley up to the neck with a number of quilts. A heavy current is, of course, needed but 3,000 to 4,000 m. a. have proved to be sufficient. We have in this way without trouble raised the general temperature up to 106°F in a couple of hours. It is therefore not necessary to use the recently developed very high frequency machines with 12,000,000 or more cycles per second in order to raise the body temperature but these machines may prove to be useful for certain diseases. It may e. g. be of value that the electrodes are not applied to the skin but the patient is simply placed between two large plates which act as a condenser.

The types of current used in physical therapy has here been discussed very briefly. For the sake of completeness auto condensation and static electricity should perhaps be mentioned. Auto condensation does not differ principally from ordinary diathermy where one large and one rather small electrode are used. The amount of current passing into the body is limited by the smaller electrode. If this one consists of a cylinder held in both hands the narrowest path of the current will be the wrists which thus will be heated proportionately much more than the other part of the body and thus really receive the main part of the treatment. Vacuum electrodes are sometimes used for the application of diathermy current. A very small current then is used and consequently not much heat could be produced in the deeper tissues. Due to a great number of small sparks, points here and there on the skin are heated up at the same time as slight stimulations of superficial nerves are produced.

As far as static electricity is concerned it seems improbable that simply the charging up of the body is of any particular value. The sudden charging is of course no static phenomenon but is similar in action to the paradic current, perhaps sometimes in combination with a high frequency current of very short duration.

Medical School, University of Minnesota.

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Education in Physical Therapy

By Willis S. Peck, M. D.

Read before the annual meeting of the American Physiotherapy Asociation, Fort Shelby Hotel, Detroit, Mich., June 23, 1930

For a number of years it has been apparent to those interested in the advancement of Physical Therapy that provision must be made for the proper training of physicians and their assistants in this field, if its agents and methods are to be employed in the most advantageous manner.

Medical undergraduate and post-graduate instruction in this subject is being developed in practically all medical schools, as the value of Physical Therapeutics is now well recognized. Although it has been the custom to teach this work as a separate course, more attention is now being paid to its collaboration with medicinal and surgical procedures.

Because of such instruction it may be expected that there will be a further increase in the general use of physical therapeutic measures, and they will be more frequently combined with other types of treatment and not administered as a separate regime. Such a change does not mean, however, that the demand for trained assistants will diminish, provided they keep pace with the advancement of the science.

One of the great difficulties at present is the lack of well-organized courses which provide adequate and diversified training, for not until a higher educational standard is reached will most hospitals insist upon the employment of accredited technicians.

There is some question as to what should constitute this training, but we must all concede that it should furnish ample scientific background on which to base the art of application. To combine the science and the art satisfactorily, it seems wise to give instruction which will develop the fundamental scientific facts at the same time that knowledge is gained by actual therapeutic practice. The reason for this is evident when it is realized that much of the theory is not comprehended until actual practice has been undertaken. Why, then, is it not reasonable to combine as closely as possible the clinical experience with the theoretical, by assigning some practical work in the early part of a course instead of relegating all of it to the latter half?

The situation which confronts most technicians when they have finished their course of training and start in a new position is often very discouraging because they have to employ methods of treatment with which they are not familiar. If, added to this difficulty, there is a lack of fundamental instruction on the part of the technician, it must be expected that the results will be far from satisfactory. This is disappointing to patient, physician and technician, who usually blame the method, and unless the technician has the initiative to inquire further, the treatment is liable to become a thoughtless mechanical process.

In order to understand more fully the need of better training, let us consider the varied situations which are open to Physical Therapy technicians. There are three general groups, the first representing hospital organizations, the second, clinics and schools, and the third, the employment in private practice.

In the first group are the general hospitals using physical therapeutic measures, particularly in the treatment of surgical, orthopedic, medical and mental cases. Often one service refers a greater percentage of the patients than the others, but as a rule the technician must treat some from all departments at one time or another. The orders for the treatment of these cases are usually based upon varying conceptions of physical therapeutic effect and deal with a variety of unrelated diseased conditions. If the technician is to cope with such a situation, she must be able to appreciate the varied posibilities of the work and not feel that the treatment is of little value, because it does not conform to the methods in which she was instructed. Should she ignore these possibilities the result will be an unbalanced department with a considerable loss in its value to the hospital.

Besides the general hospitals there are others which limit their cases to such as orthopedic or surgical conditions. Many of these employ a specially trained staff of technicians. In these institutions the procedures are well outlined and developed to an advanced state. A technician entering such a place must be prepared to adopt their particular methods at an early date or be a drawback to the smooth functioning of the department.

The second group, that of clinics and schools, more frequently calls for specialization. The clinics may care for industrial accidents; various types of mental cases or deal only with orthopedic problems. While in schools the technician must often treat cases without adequate medical supervision. If the work done in these positions is to advance, the same consideration must be given to training as in the rest of the field.

The third group, the employment in private practice, is much like the situation in the clinics, the cases being those which are sent by physicians.

It is felt that because of this variety of work which the technicians may take up, it is inadvisable to train them for specialization in any one field without their first obtaining a general knowledge of Physical Theraphy, just as it is necessary to develop the medical student in general medicine before he confines his work to a specialty.

In order to provide technicians for the various positions, many schools and hospitals are offering work under the general heading of Physical Therapy. Most of these may be classified according to the type of instruction given.

One group, usually schools of Physical Education, provides one or two courses in massage and remedial gymnastics. As a rule, the total amount of time devoted to such work varies from fifteen to forty-five hours and consists of lectures and some practice. Such instruction merely provides the student with a cursory knowledge of the subject and may not be considered as practical training in Physical Theraphy.

The next group consists of Physical Education schools with special courses, providing at least one

year of instruction in the subject. Such training may be adequate for certain types of work, but is usually far from complete and does not provide a medical background, unless arrangements are made for practical work in organized Physical Therapy departments. Even with this arrangement there is too much observation in comparison with the amount of actual practice.

Another group composed of hospitals and clinics is giving special courses of training. In these the student has an oportunity to gain much practical experience, but there is often a lack of academic instruction, since the facilities for this work are usually lack ing.

The fourth group represents those educational institutions which provide instruction in the medical or physical education schools combined with enough hospital clinical experience to give a sufficient training.

Some members of the third and fourth groups, namely, large hospitals having teaching facilities and educational institutions where instruction by the medical faculty and hospital staff is available, should offer the most complete courses. Whether they really do this depends upon the thoroughness with which the curriculum is organized.

One of the points in favor of an educational institution, such as a university, is that it demands that the student shall have satisfactory college entrance requirements. If added to this a certificate of graduation from a recognized school of nursing or a degree from a recognized school of physical education is prerequisite, the general educational standard of the students will be higher than the average.

Many of the schools in these groups are in the formative period and some are attempting to conform their curricula to the standard set by your Association and the American Medical Association. Whether a majority will do this remains to be seen, but it is certain that if they do not provide better instruction they will fall into the same category as medical schools which do not have a class A rating.

This program of instruction is the first summation of the opinion of those who are best prepared to evaluate the essentials. In it special emphasis is placed upon a high educational standard for admission, thorough preliminary training in fundamental sciences during the course and due consideration to practical application.

We are also led to believe that the aim of this program is to develop thinkers who will appreciate the possibilities in their task instead of turning out those who perform their work as automata. For this reason alone the program is commendable.

In regard to the active program most of the subjects listed and the length of time devoted to them are quite proportional to the difficulties encountered in acquiring a fundamental basis in the field.

There is little question that technicians are weak in their knowledge of anatomy, physiology and body mechanics and a thorough understanding of this part is, as we all know, essential to correct administration of therapeutics.

Some educational leaders in the field are of the opinion that less time should be devoted to some of the academic subjects, such as chemistry and physics. This may be justifiable in the case of chemistry as most of the students who can meet the preliminary requirements have had one or more years of instruction in this subject. In regard to the teaching of physics a different situation is present. Not only are there fewer students entering with previous work in this subject, but there is also a greater practical application of the physical than the chemical principles.

With the clinical subjects there will have to be some re-assignment of hours, depending upon the emphasis which different schools place upon the various subjects, or because of the rapidity with which a particular branch is advanced.

As an example of this, the scientific use of radiant energy is becoming more complicated; therefore added time will have to be devoted to Actinotherapy. At present the commonly used technic of ultraviolet application is most empirical. This of course should not be so, but the fact that it is supplies sufficient proof of the inadequate instruction in this branch.

In regard to the objection which is frequently heard, that people with such thorough training will draw away from the dictates of medical ethics, it does not seem that better education in the field will react in this way. To become more conversant with this subject enhances respect for the problem and enlightens one as to how little is really known and how much depends upon general medical knowledge. This advanced training tends, therefore, to create respect, both on the part of the physician and the technician and make for better cooperation and advancement. Should the technician stray from the guide of medical supervision, discord and failure will result.

This survey of the educational field seems to indicate that the workers who carry out most of the technical procedures in Physical Therapy must raise their standards of instruction if they are to do their part in the advancement of this science. The benefit of such an endeavor not only will be appreciated by the patients and the medical profession, but will place the technician on a higher plane.

University Hospital, Ann Arbor, Mich.

Some Uses for the Sayer Head Sling

By Florence C. Burrell

We have been sent so many patients for stretching in the Sayer Head Sling, and have had such good results, that the technique may be of interest to some, though familiar to others.

The type of case sent in for treatment, usually falls under one of the following heads:

First: "Wry neck," with muscle spasm following sudden twist or jerk, chilling, or some other unknown cause.

Second: Chronic arthritis in the cervical region with accompanying stiffness in tendons and muscles.

Third: Tension following chronic headache.

The treatment divides itself into three parts:

First, application of heat in some form to the neck. Some doctors prefer diathermy, others radiant heat or hot packs. For diathermy, which is used more often in arthritic cases, a long electrode is applied over the cervical or upper dorsal region, and a large one across the chest; the time, twenty or twenty-five minutes. Radiant heat is applied for twenty minutes from the zoolite or thermolyte, directly on the skin or on a moist cloth over the neck. Hot packs seem to be the most comforting, these are wrapped around the neck, covered with a towel, and changed five or six times in twenty minutes.

Second: The patient then lies on his back without a pillow or with a very small flat one under his head and is given effleurage over the neck and shoulder muscles until they begin to relax. Sometimes this takes fifteen or twenty minutes. Deeper massage can then be given until at least some of the soreness has disappeared. This cannot always be accomplished in one treatment, or even two.

The third part of the treatment is suspension in the head sling. This has to be worked out according to the individual, as some relax easily, while others tighten up from fear. The sling must be carefully adjusted so that the pull comes equally on both sides, and is also equally distributed front and back. The patient is told to stand on his toes, the rope is tightened, and the patient lets himself slowly down on to his heels. If the neck muscles are tense, hot packs are applied during the stretching. Sometimes the position can be held for five or ten minutes. Others need several stretchings for a much shorter period. During suspension, the shoulders are held in position, and the head rotated passively as far as possible once in each direction.

Usually, patients with arthritis have faulty posture, with head dropping forward. Posture training is started, and the patient urged to take the exercise, "backward moving of the head," several times a day.

Sometimes during the process of head manipulation, in the case of wry neck, a snap will be heard in the neck. The reason for this is not definitely known, but it is thought that a small muscle may be caught over a vertebral process. The heat and massage have relaxed the large neck muscles which have gone into spasm in order to keep the head rigid, and the small muscle is slipped off during manipulation and stretching. In such cases one treatment is sufficient.

In arthritic cases, adhesions which have formed about the joints, are stretched and in some cases broken down. This gives greater range of motion, and a decided relief from tension. These may feel relief after six to nine treatments.

The particular kind of headache responding to this treatment is probably due to muscle tension from arthritic conditions, or from faulty body mechanics and the length of time necessary for relief may be even longer than for the previous type of case.

No amount of stretching or manipulation of the head by hand, can take the place of stretching in the head sling, as the weight of the body is so much greater than the strength which an operator can give.

Oakland, Calif.

Book Reviews

RAWLINS, MAUDE: *A Textbook of Massage for Nurses and Beginners.* The C. V. Mosby Company, St. Louis, 1930.

This is a very satisfactory little book for those who desire a reference for students in elementary massage. Though by no means a primer its style, description of various movements and illustrations make it easily intelligible to those who are taking the usual short nurse's course. Miss Rawlins has had a large experience in teaching and she condenses well the theory of massage, its essential movements as well as some adaptions and conditions for specialized forms.

Ionization in Hypertrophic Rhinitis and Suppurative Otitis Media*

By Bulah Rader

Physical Therapy technicians are all more or less familiar with ionization, "that form of treatment in which an electrical current is used for the purpose of introducing the ions of a soluble medicinal substance into the body tissues" (Cumberbatch), and many have used it in their clinics. I am quite sure though that there are many others to whom the term is one of theory only, and not one of practice; and it is to this class of readers that I want to give the following simple yet effective technic for two of the many diseases that can be, and are, benefited by ionization.

These two diseases are hypertrophic rhinitis and suppurative otitis media.

In hypertrophic rhinitis the nasal mucosa is chronically inflamed, accompanied by swelling and hyperplastic changes of the soft tissues, and there is a more or less constant discharge. You can get the etiology of the disease in any good textbook; and as to the pathology, the only point I want to make is that most rhinologists believe that the affection is due to an invasion of pathogenic organisms. The type and name of these micro-organisms, if any, is not absolutely certain; only their presence in the nose in this particular disease is of interest to technicians. Most doctors seem to agree that simple congestion and swelling of tissue, even when associated with moderate tissue changes, are not sufficient indications for surgical intervention, and are trying other means to control the condition. A few have demonstrated the clinical value of galvanic ionization of zinc in such cases, and have reported excellent results.

Otitis media is usually due to a bacterial infection via the Eustachian tubes, though it occasionally enters via the blood stream. The micro-organisms usually excite inflammation which may assume the suppurative type, or they may be present without exciting any pathological reaction.

Zinc is antiseptic in its action. The positive galvanic current has several effects which, combined with the antiseptic effect of the zinc, are valuable in the conditions described above. The positive current relieves pain; it is sedative; it soothes inflammation; it hardens tissue; it dries up discharge; and it is germicidal. As the zinc is driven into the tissues by means of the positive galvanic current it coagulates the albumen, and "the coagulation that is formed is moreover a sterile barrier to the tissues and the exterior. Rest is afforded to the tissues, which rapidly progress toward structural integrity and functional efficiency" (Friel).

It is difficult to reach into the accessory sinuses of ear and nose with swabs, drops, or sprays; and ionization furnishes a simple, practical, and easy way to give the adjuvant.

We use for our treatments a 45 volt dry cell battery connected to a galvanic rheostat and a milliammeter. The current, for ionization in head cases particularly, must be absolutely smooth, free from fluctuation and under perfect control. The dry cell battery is used rather than the line current because there is the possibility of a sudden drop in voltage in the line current, and the least change, if coming suddenly, will prove a shock to the patient and may cause dizziness or flashes before the eyes. Also, the current from the battery is much pleasanter to the patient and quite as efficient as the higher voltage current.

Our solution, a one per cent zinc sulphate, is made up for us by the pharmacist; but as five grains to one ounce of water is about a one per cent solution, this can be made by the technician if desired. Distilled water is not essential although it is generally used.

For the nose we use a treatment modeled after the technic perfected by Hollender and Cottle of Chicago. The ear, nose and throat specialist sprays the nose with cocaine, then packs the side of the nose to be treated with long, narrow strips of cotton soaked in a one per cent zinc sulphate solution. As soon as packed, the patient is sent to the physiotherapy clinic, and there the metal end of the positive cord is wrapped in cotton saturated with the same 1 per cent $ZnSO_4$ and inserted into the nostril until it presses tightly against the packing already in the nose. If the packing is of such an amount that the tip of the cord will not stay tightly in the nostril, it may be held in place by the patient or by the technician. Dr. Hand, one of our specialists, sometimes uses a different means of holding the cord tip against the packing. He slips the tip through a cork the size of the nostril, and this cork holds the tip against the packing and also prevents it from touching the tissue of the nostril. The indifferent, or negative, electrode is either placed between the shoulders, if the patient is lying down, or held in the patient's hand. The current is turned on very, very slowly (two or three milliamperes or even less is used) until there is a faint metallic taste in the patient's mouth. It is kept at this strength for five minutes, then very slowly, even more slowly than when turned on, it is turned off. The patient returns to the doctor to have the packing removed. In this way the doctor can check each time on the condition of the patient, and ascertain whether or not we are getting the results that he has desired.

After ionization in the nose the discharge is increased in amount. This is quite the normal reaction of tissue and usually disappears after a few hours at most. In one case this coryza lasted for twenty-four hours and was quite severe, but after it stopped the patient felt decidedly better than he had for months. The tissues are usually a grayish white after the treatment. In two or three days the pulpy tissue should become harder and firmer, increasing the ventilation through the nose and decreasing the drainage. It is an easy treatment to give, and painless to take.

The technic used for the ear cases is even simpler. There are many good appliances on the market that can be used to hold the cords and the zinc solution during the treatment, but we are getting very good results without these. The patient lies down with the affected ear up. The ear has been cleaned as well as possible just before the treatment. The positive end of the cord tip is wrapped in cotton soaked in the one per cent zinc sulphate, then is gently inserted in the ear.

*This paper won second place in the Physiotherapy Review contest.

With a medicine dropper we fill around the tip until the fluid fills the ear canal entirely, and the canal is kept full during the treatment. The negative electrode is placed under the patient's shoulder or in his hand. The current is slowly turned on, and it must be slowly, for we have had two cases where we had to discontinue the treatments because of dizziness. We give from three to ten milliamperes of current, and we never use more than ten volts in these cases, no matter what the milliameter may register. This amount of current is left on for five minutes, then gradually turned off. Have the patient take his time in getting to an upright position; and dry the ear thoroughly with cotton.

In both the nose and ear cases we try to give the treatment twice a week. Three or four treatments usually are enough, though in some cases we have many more. That, however, depends entirely upon the suggestion of the attending physician.

Out of fifty-five cases treated in the last six months, nineteen left for work before we could check on their results. Of the thirty-six remaining, we secured very good results in ten cases; enough relief so that the patient felt satisfied to have taken the treatment in sixteen cases; in five no good at all was received; and in the case of the last five, the condition was aggravated so that we stopped with one treatment.

The following are a few typical cases:

Case I. A post-operative mastoid, draining ear, ordered treated to clear it up enough to permit a radical operation. She was given forty minutes of infra-red, followed by five minutes of zinc sulphate ionization to the ear, three times a week. She received seven treatments in all. The drainage stopped, discomfort ceased, and no operation was needed. This was six months ago, and her condition remains unchanged.

Case II. Acute otitis media. This case was given deep therapy lamp followed by ionization for three treatments, over a period of ten days. Discharged under observation as cured.

Case III. Hypertrophic rhinitis. Was cleared in five treatments of ionization, and returned to work.

Case IV. Multiple sinusitis and hypertrophic rhinitis. Received six treatments in all. Patient took a severe cold at about the time of the third treatment, and it did not affect her sinuses or nose as it always had previously. She felt very much better for the treatments.

Case V. Purulent otitis media. Ear had been draining for forty-two days. Cleared up in five treatments of ionization, and so far (five months later) has had no return.

Case VI. Vasomotor rhinitis. Given six treatments. This man was given relief from his sneezing after the first treatment. He had to rejoin his boat and could not continue the treatments, but expects to return the next time he reaches this city.

Case VII. Hypertrophic rhinitis with polypoid complications. One treatment was given. Extreme coryza resulted, lasting for several hours. Patient felt much worse, and was discontinued.

There are several contra-indications, and case VII, given above, was one such; but usually, if the work is done only under the supervision and personal direction of the ear, nose and throat specialist, these need not be a worry to the technician. In Hollender and Cottle's book they give as contra-indications:

(1) Tuberculosis of the middle ear.
(2) Presence of granulation or polypi.
(3) Area of caries in tympanum.
(4) An attic or mastoid involvement.

In conclusion, I cannot do better than quote Morse, who gives the following advantages of ionization over other medication:

"1. Medicinal action of the metallic salt upon the diseased surface is more accurately located.

"2. Drugs introduced into the system in a nascent state, and much more active than in chemical combination.

"3. The salts formed are driven into the tissues, rather than laid upon the surface of a mucous membrane.

"4. There is obtained, in addition, the beneficial action of the physiologic properties of the current."

San Francisco, Calif.

Physical Therapy, at Home and Abroad

By Beatrice E. Chadwick

THE PREAMBLE

Why did I make that rash promise? It looked so easy in the distance, months away; it looks so difficult now close to the last day. I have gathered all my notes together; tables, chairs, couches and beds are literally littered with notes. I am bewildered, don't know where to begin and if I began I should not know where to leave off. Besides, I responded to an SOS from Miss Babb and went to Tacoma twice since making that rash promise, and now there is not time to cope with such a mighty theme.

Sir Oliver Lodge says, "Inspiration really exists." I hope he is right. The same scientist also says, "We know that the Universe is built of two units, two minute elements of electricity—positive and negative. These two fundamentals are united by a third, an intangible something called radiation or ether, and popularly known as light, but for the welding and unifying of ether the atoms would be chaos."

I believe he is right. I have the chaos and need the fundamental, unifying element to reduce the chaotic litter into order.

What does it say here? "Our doubts are traitors and make us lose, what oft we might have won, by fearing to attempt." Thank you for the prod, Mr. Shakespeare, maybe I will try and do something. Then I come across this: "Produce! Produce! Were it but the pitifulest, infinitesimal fraction of a product, produce it in God's name. 'Tis the utmost thou has in thee; out with it then. Up! Up! Whatsoever thy hand findeth to do, do it with thy whole might. Work while it is called day; for the night cometh, wherein no man can work." Oh Mr. Carlyle! you know me or my prototype. Now I am lashed into action. Be it known that I will write about Physical Therapy, at home and abroad, and we will call this soliloquy, "The Pre Ramble."

OREGON CHAPTER

The members of Oregon Chapter felt pleased and honoured to entertain other members of the American Physiotherapy Association who assembled in Portland, for the eighth annual convention, July 8, 9, 10, 11, 1929. There were delegates from Massachusetts, Minnesota, District of Columbia, North and South California, Pennsylvania, New York, Michigan, Washington, Oregon and probably other states too.

The first day was taken up with registration of members present and an informal tea, where we spent a delightful time getting acquainted with each other. It was very nice to meet all those people many of us had only read about, and secretly marvelled at their executive ability. The evening session was called to order by Miss Furscott, president of the association. She was supported by Miss C. Ballard, secretary. They looked brave and rather lonely on that big stage. Dr. C. Elmer Carlson, an old friend of many present, gave a cordial welcome to all; then Dr. H. M. F. Behneman presented a very interesting paper. All the papers and all of the business transacted you have read in our REVIEW, so I will only add that we had an excellent program every day and the time passed very quickly.

The banquet, at "The Sign of the Rose," was a brilliant success, thanks being due to Miss Elizabeth Doyle for her capable management of this important item of our program. The food was excellent and daintily served, the tables were decorated with baskets of lovely delphiniums, and Dorothy Perkins roses with beautiful foliage trailed down the tables "in and out and round about." The ladies were charming, pretty and witty; the gentlemen were gallant and brave—very brave, extremely brave when it came to reading telegrams concerning members present.

Miss M. Ewing, president of the Oregon Chapter, was a gracious and charming toast mistress. Miss Cora Howes, chairman of the convention program, the Applegate twins and others who had worked like "Trojans" all looked their prettiest.

The speakers were all so clever and witty no words of mine could adequately describe the spontaneous, joyous merriment they created. Miss Mary McMillan rose to pay tribute to the memory of the late Dr. Grainger, as did Miss Dorothea Beck, our editor-in-chief.

Many telegrams were received. One for Miss McMillan asked what was to be done with the truck of telegram from satellites everywhere. Miss Babb was assured the name technician was struck off forever. Dr. Markel was accused of eating three dinners that night. Dr. Behneman was warned not to accept more than one invitation, because he had only one boiled shirt. The captain of the ship on which Miss Furscott returned home sent one to say, that "Any arm held in the horizontal position for several consecutive nights was very likely to be indisposed." Miss McMillan told us how one of her students got her anatomical and nautical knowledge mixed when she said, "she knew that the sternum was behind."

We were a very happy party but eventually we had to say au-revoir and disperse. The convention was over almost before we realized it was here and left us in a state of exhilaration with all the mental stimuli we had received, and the personal contact of kindred souls.

Here's hoping we may all meet again next year.

At our chapter meeting last night, Feb. 18, Dr. Arthur Jones gave us an interesting talk on "What the physician expects from his physiotherapist." Some of the problems he tackled were: How to arrange the patients and not get things crowded, because the doctor might be called away and expect his patients taken care of, too. It requires much tact and quick thinking, even after careful planning in advance, because extra patients will come in some days and it is a problem to treat them as prescribed. The technical knowledge of doctors differs on this subject—most of them are interested but not all equally well informed. One will want definite technique, another may say "give them the whole works." So we must tactfully point out our reasons for advocating certain treatment or contra-indications.

It is desirable to get the patients examined frequently, get the doctors interested in the daily routine, and both reason together, then each one can suggest changes according to specific knowledge. Sometimes delicate situations arise, and it may be necessary to insist on the dignity of our training and experience, so we must show a good biological reason why the tolerance of patients

differs, etc. The milliampere meter is not always a definite gauge, and it is a good thing to let the doctor know that we are alive to these things and guarding his patient from burns, etc.

Dr. Jones thinks "The Principles and Practice of Massage" by Dr. J. E. Mennell, M. A., M. D., is a very good book. He also spoke very highly of the American Physiotherapy Review, and said he was amazed and delighted with splendid articles he read there. He said many doctors were not even aware of the REVIEW, so it is up to us to get them acquainted with it and so lead the profession away from the old ideas.

At our March meeting Dr. Louis K. Poyntz is going to give us some practical demonstrations in Electro-therapeutics at his medical X-ray and physical therapy clinic, Portland. We have to keep in step with all you other chapters.

WASHINGTON CHAPTER

Recently I attended some of the monthly meetings of the Washington Chapter, and I must say that they are a very enthusiastic crowd of lists. The December meeting was held at the Swedish hospital, Seattle. The physical therapy department there is very well equipped, and I was glad to see a nice rest room adjoining. All physical therapy departments should have a rest room where the workers can relax during odd moments when waiting for patients, for this work is very depleting, especially where the departments are not well supplied with fresh air. Dr. Jeffries of Seattle gave us an address on "Arthritis" which was very interesting. He says that some success is being gained by sero-therapy and ionization of the affected joints with a suitable solution.

The January meeting was held at the county hospital, Seattle. As usual, there was a very good attendance in spite of inclement weather, Miss Elsie Childs, the president, was there in good time, then Miss D. Sorenson arrived with a car full of beauteous maidens in fur coats, then Miss Marguerite Irvine, full of business and peppy as ever.

After the chapter meeting, Dr. C. A. Smith gave us a very interesting talk on electro-therapy. He also specified the usefulness of ionization when used according to its rules and laws. Some of those he mentioned follow: Used as a vaso constrictor, positive pole. Hemorrhage of uterus and submucous fibroids reduced. Hemorrhage of nose stopped. Adolescent goiter reduced, etc. Used as a vaso dilator, negative pole. Dysmenorrhoea—Uterine canal may be enlarged. Stricture of urethra may be overcome by using sounds, gradually using increased sizes, larger and next larger. Stenosed laryngeal duct may be enlarged. Adhesions may be reduced.

In suppurating middle ear, zinc ionization will often cure it. Empyema may be cured by zinc ionization, sciatica and brachial neuritis also. I am glad to see ionizations revived for we used them much more than diathermy in Canadian Military Hospitals, and I have believed for some time that ionization would prove useful in arthritis and kindred troubles.

After the meeting adjourned Miss Hughes served us dainty refreshments, then we had to leave the cosy reception room and go into the cold, cold blast and snow. Miss Babb and I stamped up and down to keep warm till our stage arrived and we watched Miss Sorenson load her cargo of beauty in the rumble seat.

On our ride to Tacoma Miss Babb indulged in several wings and a nod or two but roused up sufficiently to step out of the stage into a taxicab. There she dozed again for a few minutes. All at once she sat up wide awake, "Apples! Apples! I have no apples, we must call at the old man's and get some apples." So we did. Then we let ourselves into the faculty house very, very quietly and crept upstairs to bed.

The Tacoma General Hospital ranks as a first class institution. The physical therapy department is very popular and up to date. The medical staff is very interested in it and make full use of it. The rooms are all very bright and there is plenty of fresh air. The white tiled swimming pool is a great attraction; the little patients love it; many of the staff and patients, able to be in wheel chairs, come and look at it longingly. It is very fascinating to watch the kiddies kicking and splashing.

The department is well equipped to give students a good training in physical therapy in all its branches. The work there is very interesting and one gets a wide variety of experience. My patients there ranged all the way from two weeks to eighty-three years of age. (It was very interesting to watch three diabetic gangrene sores on a patient's foot heal up with physical therapy.)

An orthopedic clinic is held every Thursday for children—those taking treatment, also new patients, are examined by Dr. Rich, Dr. Kanaga and Dr. Dodds. Those requiring medical or surgical help are entered into hospital, and the necessary treatment is prescribed for the others.

SOUTH AFRICA

In South Africa masseuses have got compulsory registration, in common with doctors, dentists and nurses. The association is affiliated but not amalgamated with the South African Trained Nurses Association. The annual meetings are arranged to take place together, in a different place each year. There are quite a large number of masseuses in the country—all the largest hospitals have a massage staff and in addition there are many engaged in private practice.

There are not so many osteopaths and chiropractors there but their number seems to be increasing. However, it is hoped that the formation of the massage association and compulsory registration will check this increase.

ENGLAND

In 1925 Sir Oliver Lodge delivered an interesting lecture, in the course of which he dealt with the healing power of light. That power has now become familiar in medicine and hence the establishment of institutions for such healing purposes. Sir Oliver points out that light has a pressure and that it is common knowledge what happens when it encounters a particle of dust, or in other words an atom of matter. This has been investigated by photo-electricity, when it has been found out that an electron jumps out of the atom and the atom is ionized. This ionization of matter by light is becoming familiar in medicine, particularly in the action of light on the skin, and its remarkable effect on the nerve supplying retina of the eye.

In explanation Sir Oliver says that on the retina, for instance, the nerves are bombarded by the ejected electrons, each striking with an energy appropriate to the frequency of the receiving vibrations, thus giving the different color sensations through the extraordinary interpretative power of the mind, through its organ the brain. The destructive influence of this section on micro-organisms, such as anthrax-bacilli, when they are exposed to ultra violet rays, is well known. The health-giving power of these same ultra violet rays is constantly receiving more and more attention.

Sir Oliver says that the study of radiation has discovered that mysterious but fundamental entity, the quantum, a knowledge of which was leading to elucidating the temperature, the constitution, the age, the speed and the history of the various cosmic masses. Through it the

formation of woods and the growth of vegetation, on which animal life depends, have been explained, and now the sanitary, invigorating and beneficent work of sunlight on the human organism is being more and more appreciated, it is being more and more studied and applied by those who have the requisite training. He expresses the hope that a recognition of the electric and ionizing power of such rays may be a hint in the right direction to those engaged in this important branch of medicine.

The British Medical Association, representing over 30,000 doctors, has invited the Society of Apothecaries to inaugurate and keep up to date a roll of registered persons to whom members of the association may confidently issue prescriptions for treatment by electricity and irradiation, and also to ensure that unqualified assistants in electro-therapeutics should have adequate training and registration in this branch of medicine. An approved course of training will be necessary for all who desire to be placed on the roll, and all applicants will be required to pass an examination after May 30, 1930. The applicant must produce satisfactory evidence of experience in the following subjects: Ultra-violet radiations, light and heat, high frequency current, including diathermy, Faradism, direct and sinusoidal current, etc. The society undertakes to advise medical men by every means in its power to employ only registered assistants in the treatment of their patients. Registered persons will be designated bio-physical assistants and be entitled to use the registered letters B. P. A. They will receive from the society a certificate of registration and a book containing regulations. The register will be circulated widely each year to registered medical practitioners, to medical and public libraries, and to public medical officers, so that it may be available for reference in every district of the country. Members of the Chartered Society of Massage and Medical Gymnastics are advised to apply through their own society.

Many of the military hospitals in England have been converted into orthopedic hospitals. Each hospital has a number of scattered clinics where out-patients may receive treatment. Convalescent homes are also maintained in country districts. There are orthopedic brace departments and shoe repairing shops near all out-patient clinics, all this work being done by physically handicapped people. Vocational work is also provided for shut-ins, instruction being given in the patient's home if necessary.

The central office is situated at 117 Piccadilly, W. I., London. This central committee for the care of cripples has published a map showing the spread of orthopedic schemes in countries and cities, and the still unprovided districts. The object of this association is to promote a complete scheme for the provision of treatment, education, training and employment of cripples.

The out-patient clinics are visited by a surgeon from the main hospital staff, patients are examined, plaster casts and braces are changed or fitted as required; both adults and children are cared for under these arrangements. Many trained volunteer workers give their services. One volunteer acts as secretary; another one assists in dressing and undressing the patients, another prepares plaster bandages and assists in their application; another one marshals the patients in order for their examinations. In this way everything works very smooth and orderly, and there is no unnecessary waiting or confusion and the maximum amount of good work is done with a minimum of expenditure.

The physical therapy departments are well equipped and staffed. The workers must have taken a course in medical gymnastics extending over one year and they must have passed the examinations given by the Chartered Association of Massage and Medical Gymnastics.

The daily number of patients average around seventy. Sun treatments are emphasized in hospitals, homes, schools and convalescent homes. There are also homes for crippled children where sunlight and open air treatment form the main therapeutic procedure.

I have read that tuberculosis is more prevalent in England than in the United States in proportion to the population, and infantile paralysis is more prevalent in the United States in proportion to the population.

The Kings Thanksgiving Fund for Hospitals, thanks specially to the advocacy of the Prince of Wales, amounted to 490,000 pounds sterling, approximately $2,450,000, and of this 200,000 pounds was devoted to the purchase of radium. A great step forward has been taken in the creation of the National Radium Trust, to secure the fairest distribution and most effective use of this, the most precious substance in the world. Among munificent gifts made direct to hospitals was one of 58,000 pounds anonymously for Southend-on-Sea.

It is gratefully acknowledged that physical therapy helped considerably in the recovery of England's beloved King, therefore his loyal subjects show their gratitude in a practical way.

"Barts" A. D. 1123—1930

The Royal Hospital at St. Bartholomew was founded in the year 1123, its first charter being granted by Henry 1st to Rahere, a court favorite who became a priest, and whose tomb and watching chamber still exist in the church of St. Bartholomew the Great, close by the hospital. Down the centuries "Barts" has always been a home of research, the oldest hospital in London, known and loved in every part of the world. Eight centuries of historical medical tradition, the cradle of English speaking doctors and nurses, during all this time it has never faltered from its founder's vow of pity, for all those afflicted with ill health or disease.

Although "Barts" has resolutely faced the problem of reconstruction and modernizing of obsolete buildings, progress is hampered owing to lack of funds. This necessity has caused "Barts" to issue this urgent appeal, the second in 800 years and the first ever made to the Empire and the English-speaking races: "You probably do not realize the debt of gratitude you owe to this hospital, even though you were never a patient there, for this is the mother of all hospitals, and its son, Harvey, was the father of modern medical science. He lived between 1578-1657 and he discovered the circulation of the blood. In all likelihood the doctor and nurse who stood by at your birth were, directly or indirectly, trained by 'Barts,' for the experience gained from the wards and research laboratories is in use in every part of the globe. Time and again it has pointed the way to advance."

On Dec. 4, 1929, the Prince of Wales set in motion a giant revolving lighthouse signal on the hospital roof, as a world wide S O S for $5,000,000. It is an appeal to further the cause of medical science as practised and taught by "Barts" doctors and nurses in every corner of the earth: for its service knows no boundaries. Gazing up at the great beacon set in motion by the Prince of Wales, with its beam visible for 20 to 30 miles, one must realize that each flash of this light as it pierces the darkness is a real S O S, a reminder of the grim fight for life being fought by some fellow creatures.

(Any nickles and dimes sent to the writer, 435 East 33 St. North, Portland, Ore, will be forwarded gladly.)

CANADA

Address delivered by the writer to an audience at Victoria, B. C., Dec. 6, 1925

You have asked me to tell you something about physiotherapy and its relationship to the proposed sola-

rium for crippled children. I am glad to have the opportunity to tell you something about physiotherapy because I find that it is not known in Victoria as it should be. In European countries, the United States of America and Eastern Canada it is more widely understood.

Much of my time has been spent in offices trying to interview members of the medical profession. My home is close beside the largest hospital and during the last ten years I have seen many new additions, handsome new wings costing thousands of dollars, but there is no provision for physiotherapy nor do they want to be told about it. The headquarters of the Canadian Association of Massage and Remedial Gymnastics are at Montreal. Only those properly qualified can be members—no osteopaths or chiropractors are admitted. Our first rule is to accept no work other than through a doctor of medicine. We are not allowed to advertise but we are in duty bound to make known the existence of our society.

During the war it was discovered that something more than surgery was needed to reduce the maimed soldier's disability to the minimum. The Canadian Army Medical Corps realized that very efficient help was needed, so they organized the school of Orthopedic Surgery and Physiotherapy, at Hart House, University of Toronto.

Being a member of Victoria Central Nursing Division, and having had three years experience in military hospitals as a V. A. D. nurse (member of a Voluntary Aid Detachment) I was accepted as a student, so I journeyed to Toronto. After three months intensive study we took our probationary examinations. Those who failed left Toronto for home the next day, those who passed these examinations, if their deportment and manner were considered suitable for the work, were retained and given a small allowance towards their maintenance for the rest of the training period. Every week we had a test examination and every week a few more went home. Some how I managed to be one of those left to pass the final examinations. I do not know, but I was so tired that I refused to reverse the points of my veil for the graduation class photograph. The following day we were placed in military hospitals to work under strict observation, until we were judged to be capable.

Only those familiar with physiotherapy fully realize what can be accomplished by scientific cooperation with mother nature in her wonderful process of healing. Because I know what can be done for crippled children I feel it is my duty to enlighten others.

It is every child's birthright to be healthy, if that is possible. The human body is a very complex and scientific structure and any deviation from the normal conditions has a far reaching effect, often creates disease, seriously undermines health and is a great handicap in the battle of life. When surgical help is necessary no other agent can take its place, but surgery alone will not restore lost function, although it is often the first step necessary towards an ultimate recovery. The proposed sun cure home will not duplicate the work of existing institutions; it is for the prolonged treatment that is necessary to complete a cure and restore lost function, after the acute stage is passed and the surgeons have done their part to correct any anatomical abnormity.

In physiotherapy we make use of the natural forces to help nature restore equilibrium. We never give any medicine, but we try to assist the natural processes of the human body. Physiotherapy is a large subject and it would take a long time to fully explain every method, so I will briefly mention some of the most important agents used.

1. Massage—Massage is a scientific manipulation of the soft tissues of the body, with a definite, therapeutic object in view. The operator must know what lies under her hands, what good she expects to do and what harm she can do. This demands a good knowledge of anatomy, physiology, neurology, pathology and psychology, the blood circulation, the lymph circulation, the processes of respiration, digestion, absorption, assimilation and elimination, the process of inflammation and some other things besides the theory and practice of massage. About twenty different movements are employed, not one of which could be designated as rubbing.

2. Remedial exercises—These may be passive, assisted, free active or resistive. It is necessary to understand the structure of all articulations or joints, the normal range of movement possible at each joint, and the muscles which produce the movement, the arterials and the nerves which supply the muscles and joints, etc. It is most important to get a correct diagnosis of the disability from a doctor of medicine, because sometimes a joint has to be kept at rest for a period of time.

3. Electro-therapy—This includes diathermy, ionization, auto-condensation, also muscle testing and electric stimulation to exercise paralyzed muscles, etc. The operator must understand the different electric currents and how to use them.

4. Heat, light and water—We must also understand the therapeutic value of heat, light and water in conjunction with massage and remedial exercises and the mechanical appliances to aid each case.

5. Ultra violet irradiations—These rays are becoming known to medicine, because of their great healing power when applied scientifically, also for the destructive power of some of the rays when applied to bacilli. These rays are often called artificial sun's rays, because they duplicate the rays from the solar spectrum, which we are deprived of by our mode of living and by climatic conditions.

A physiotherapy department was presented to the Victoria Hospital for Children at Chelsea, as part of the wedding gift to Princess Mary. After the war Princess Mary took a course of training at this hospital and saw the unquestionable benefit derived from physiotherapy. Princess Mary trained and served in military hospitals as a V. A. D. nurse (member of a Voluntary Aid Detachment, a branch of the Red Cross). I have a souvenir which Princess Mary sent out to other V. A. D.'s, at Christmas, 1914, which I value very much. The memory of the late Queen Alexandra is to be perpetuated by additional apparatus in certain hospitals, for supplying these ultra violet rays. Her life was spent in noble effort to relieve suffering and she was very interested in physiotherapy.

In 1920, the Canadian Association of Massage and Remedial Gymnastics arranged a postgraduate course for its members, which lasted about three months, so I journeyed to Toronto again. Part of the clinical work was taken in the Toronto General Hospital, and part in the hospital for sick children, both of these being university hospitals. The work was a revelation to me. I had no idea there were so many crippled children in the world. Some of the deformaties were cogenital, others acquired. There were dislocated hips and diseased joints, feet turned the wrong way, tubercular disease of joints and spinal column, various forms of paralysis, and troubles caused by endocrin disturbance, (or the glands of the body not functioning right).

We saw the little patients as they arrived at the hospital. The surgeons told us what they hoped to do. We witnessed operations and saw the patients in various stages afterward. Eventually they came under our care for massage and remedial exercises and re-education of muscle function.

Then we progressed to the medical gymnasium. A

table of exercises was prepared for each child according to its particular needs, and carried through till the child became quite strong, the child attending the gymnasium for years, if necessary, as an out-patient. Sunlight and fresh air are the greatest curative agents known, and combined with physiotherapy under medical supervision, delicate children can be made strong, many deformities can be corrected or arrested, and lost function can be restored by patient re-education.

Every child should also have some education and vocational training suitable to its mental capacity, because the mind has a profound influence over the body, so it is advisable to keep it healthy by useful occupation. The mind can be so directed that physiological processes are assisted.

Now I hope that I have made this one thing clear to you. Many deformities can be cured in childhood that would be impossible in adult age. So the Provincial Womens Institutes are sponsoring a noble cause and one which deserves the assistance and support of every Christian person. I sincerely hope they will be able to establish the solarium and see that it is worthily maintained at all times, with one thought supreme, "To do to others as we would that they should do unto us."

THE QUEEN ALEXANDRA SOLARIUM

The Queen Alexandra Solarium was opened Mar. 1, 1927. It is situated at Malahat Beach, 50 yards from the salt waters of Saanach Arm, Vancouver Island, British Columbia, about 45 miles from Victoria, over the famous Malahat Drive. My first visit there was made Sept. 11, 1929. Miss Stone, the lady superintendent, received me very cordially and escorted me around the place and presented me to Dr. C. Wace, the medical superintendent.

Being the rest period most of the children were on their cots on the long open-air veranda, some of the larger ones were signaling on the beach, others were in the open-air swimming pool. This open-air, salt water pool is greatly enjoyed by the children and also proves a valuable adjunct to other physical therapy treatment, both by the stimulating effect on the metabolism of the body as a whole, and also in the treatment of infantile paralysis cases, in which the weakened limb can be freely exercised in the horizontal position buoyed up by the water, whereas exercise in the erect position might be impossible.

My attention was immediately drawn to the remarkably well fitting, light weight corrective jackets and splints they were wearing. Upon enquiring I was told that they were made of non-inflammable celluloid in their own work shop, by Miss E. H. Wace and an assistant, who was a war veteran. Miss Wace was trained in this work under the personal direction of Sir Henry Gouvain, one of the founders and directors of the Alton Home for Crippled Children in England. A minimum charge of $6.00 per week is made when parents are able to pay. Applications for admission of patients should be made through local physicians to the medical superintendent at 918 Government St., Victoria, B. C.

No child who can benefit by the treatment ever has been, or ever will be, refused admission to the solarium because the parents are unable to pay the fee. The solarium has no endowment fund, the cost of providing the home is met partly by payments from parents and the government hospital grant, but the necessity for an endowment fund is acutely felt by those who are responsible for the success of the work.

In 1922, a desperate mother wrote to the secretary of the Women's Institutes of British Columbia asking for help for the treatment of her child, who was suffering from tubercular disease of the spine. The mother's request was met with instant response, the money was raised towards the expense of this child's treatment, and this appeal was the starting point of the movement to build this solarium. This little patient has recently become stenographer to the medical superintendent, the disease is cured, and will remain cured, if she can lead a sheltered life for a few years.

The solarium is open to all crippled children of British Columbia regardless of color, race, creed or means, provided they are of normal mentality, are in the opinion of the board of directors suitable cases for the treatment provided, and are under the age of 12 years in the case of boys and 14 years in the case of girls. No child who can benefit by the treatment will ever be refused because the parents are unable to pay the fee for maintenance.

The use of the words, "a crippled child," conveys to the popular mind the idea of a child with some marked physical deformity, but this application of the term is misleading and fails to recognize the large number of children in whom early treatment, continued over a long period if necessary, will prevent serious illness, and its resulting physical deformity. The definition of a crippled child adopted by the board of directors is, "A child whose normal physical activities are crippled by illness, accident, or from birth, whether physical deformity is present or not."

The idea of establishing and maintaining a solarium for crippled children originated with the Women's Institutes of British Columbia and it is conducted under their auspices.

The site for the solarium was selected after consultation with the Dominion Meterological Service. It has a maximum of sunshine, an excellent southeastern exposure close to the sea, with shelter from the north and prevailing winds. The main building is 240 feet long by 50 feet wide, and is used for wards, treatment rooms, etc. The wards face the sea through glass sliding windows of the Hoffman type, which are kept freely open. In front of the wards is a verandah 12 feet wide extending the whole length of the building. During the greater part of the year the beds are wheeled on to this verandah, and there the children lie and sleep during the day and whenever possible at night, too. Shelter from showers and from excess of sun is provided by heavy canvas awnings. Runways lead to the lawn, beach and salt water pool, so that all children can be taken there to rest under the trees, play on the beach, or splash in the pool.

The solarium is not a hospital, in the ordinary sense of the word. Acute cases of illness and cases needing operation are not admitted. All such are treated in hospitals and moved to the solarium as soon as their condition allows. The treatment therefore is essentially conservative and is based on a recognition of the value of fresh air, sunlight, good but simple food, sea bathing, regular hours, and the maximum of sleep. No child with active tubercular disease of the lungs is admitted.

Great importance is attached to the scientific use of all physical methods of cure, such as massage, muscle re-education, electrical treatments, radiant heat, and ultra-violet ray lamps. The swimming pool is a very useful adjunct to the other treatments and is greatly loved by the children.

In addition to the physical therapy treatments, a marked feature is the school maintained by the educational department of the Government of British Columbia. Trained certificated teachers conduct classes consisting of children on crutches, in wheel chairs, and in cots. Besides the regular school, they are taught to sew, knit, draw and sing. All the children display keen interest in the school. Their young minds and bodies are

like young plants—very sensitive to healthy conditions and responsive to their surroundings. For the first time most of them attend school and find companionship. Happiness reigns there. So beneficial has the school proved to be that a special teacher is employed for the summer vacation.

Visitors are confined to adults for fear of introducing infectious diseases. Admission to other than parents is by permit obtained from the main office, 918 Government St., Victoria, B. C.

Reports are made to parents living at a distance monthly. Children who can write send one letter a week to their parents. Due attention is given to the celebration of holidays, and birthdays are very important events. When treatment is completed children are returned home, but the interest does not end there, each case is followed up. The medical superintendent, with the assistance of the Provincial Board of Health, the Victorian Order of Nurses, and local physicians, keeps in close touch with the parents as to the condition and progress of each discharged patient.

Children showing any recurrence of their disability may be readmitted to the solarium if necessary.

435 East 33rd St., North, Portland, Oregon.

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All changes of address must be sent to the Secretary, Treasurer, Director Bureau of Appointments and General Manager of the Review. This will assure delivery of important notices and of the magazine. No second class mail is forwarded.

EDITORIALS

"The standards of ethics for the American Physiotherapy Association shall be as far as possible those of the American Medical Association. All members shall practice only under the prescription and direction of a licensed physician."

The above statement is an amendment to the by-laws of the Association which was passed at the 1930 Convention confirming a policy long held by the Association.

The last issue of the REVIEW contained, on its editorial page, a letter in which the following statement appeared: "I feel very strongly that the fewer medical heads we have to clinical physical therapy departments, the sooner will the profession as a whole become physical therapy minded."

Lest some of our readers interpret this as the policy of the Association we take this opportunity to state that this was an expression of the personal opinion of the writer and that the policy of the Association is expressed in the amendment quoted above.

This is in accord with the expressed opinion of the American Medical Association as stated in the Journal of the A. M. A., October 16, 1926, page 1302, that: "Physical therapy must be recognized as a definite part of medicine, to be practiced and controlled by graduate physicians. It should be used only as one of the triad of medicine, surgery and physical therapy. It should be prescribed only after careful physical and laboratory examinations of the patient have been made. It should never be prescribed except by a physician thoroughly trained in the use of physical agencies."

The American College of Surgeons in their Manual of Hospital Standardization, page 21, also states: "The director of the department of physical therapy should be a physician who has had special training in this branch of work, as well as extensive clinical experience. This is essential, not only for the safety of the patient, but the carrying out of scientific treatment. Well trained technicians are invaluable, not only in carrying out treatment ordered but in observing and reporting symptoms and reactions to treatment. They should always be under the supervision of a medical director."

THE EXECUTIVE COMMITTEE.

Let us think of the Northern California Branch of the American Physiotherapy Association as an organization but not from the point of view of the individual membership of which it is comprised. Then regarding the chapter as a definite organ having positive qualities of its own the thing that seems to stand out as most important is a feeling of chapter consciousness.

To be sure, such a quality could not exist unless it had been created by the members of the association, but having been instilled by its founders it has continued to date and grown along with the enlarged list of chapter members.

As in all societies, the foundations were laid by the most able and most energetic. These leaders having done their bit toward making a place for us as a chapter along with the other chapters belonging to the National Organization are still as active as in the beginning. Their interest has not gone stale on them. Their attitude has not been that of "I've done my share. It's the other fellow's turn to do his." Neither has the leadership and interest been restricted to the original group but this circle has enlarged as the chapter grew, embracing all members, old and new, who wished to be included. Through this open mindedness has been created the state of mind spoken of above as "chapter consciousness."

How may that phrase be interpreted? That from year to year our local association has increased in membership considerably. Those who were eligible have joined and have become a part of us, not only paying their dues, but attending the meetings in large majority. And the majority of members have not only come to the association meetings but have performed the duties assigned to them as officers or members of committees. There has been activity in association of affairs not by a few alone. To say that each member is an enthusiastic and energetic worker in the Northern California Chapter would be incorrect but there is an ever widening circle of interested ones. The disinterested are in the minority.

People coming from abroad, from Canada, and from other states have been admitted as members. The new as well as the old have helped us in that their attitude has not been merely one of I want to get a position and the best way to get it will be to affiliate myself with this group, which is known as the Northern California Association of Physiotherapists. To be sure, it is one of the associations' duties to its members to make them feel that it is interested in them as individuals and that as an organization of physicaltherapists it will help those belonging to it to obtain positions. Outside of any beliefs in individual benefits

which members have a right to expect from the association they in turn, both the old and new members, have given the chapter the benefits of their presence and ideas, their ability to lead and to follow. It is through such chapter spirit we have been able to take our place in the National Organization and do whatever it might be we have done toward being part of that unit. Because of the virtue of chapter consciousness we hope to be increasingly useful to others and to ourselves. J. L. T.

San Francisco.

The American Academy of Physical Therapy will hold its meeting at the Statler Hotel in Boston on the twelfth, thirteenth and fourteenth of November. Doctor Corbusier, who is on the committee, cordially repeats the invitation to members of the American Physiotherapy Association to attend the program meetings.

On other pages of this REVIEW appear comments on Education in Physical Therapy. Excellent comments they are—stressing the necessity of more adequate training both in academic courses and clinical practice and how truly does one writer summarize that "advanced training tends to create respect both on the part of the physician and the technician and makes for better cooperation and advancement." But these writers and many others have omitted the personal equation, reckoning without which makes education a liability and the graduated technician an unknown quantity.

A young woman about to register for training as a physical therapy technician should be willing to face a rigid self-examination. If she can unflinchingly review her entire gamut of attributes and they pass gallantly she may with confidence (although humbly) start her career; but if there be even one small undesirable hanger-on she were wiser to think again. Physical therapy is a jealous mistress and demands wholehearted allegiance from her devotees.

A strong and buoyant vitality; a healthy, clean and balanced mind; infinite capacity for hard, conscientious, accurate work and self-discipline; patience, kindness and a sense of humor, all three, which with charity, should never fail; self reliance and selflessness; ability to lead and ability to follow; adaptability and steadfastness; honesty; tact; and faith in the Infinite which is beyond the material—all these must pass in review. Then as a fit frame for these inner qualities there shines the physical. The physiotherapist must look the part; she must carry herself beautifully; she may not talk about operations nor let the corners of her mouth droop down; she should smile with her eyes as well as with her lips; she must be exquisitely groomed; her voice may not jar on jangled nerves; and, lastly, service not shillings must be the measure of her profession.

The days of Sairy Gamp are gone forever, the old-style husky "rubber" is fast following her. The mediocre techician is proving her inadequacy for rehabilitation of the sick must be in the hands of one whose very fulness of life enriches those with whom she comes in contact.

AMERICAN PHYSIOTHERAPY ASSOCIATION

Application for Membership

NAME .....

ADDRESS .....

PRESENT OCCUPATION .....

Send Application to the Secretary

Constance K. Greene,
53 Burpee Rd., Swampscott, Mass.

Abstracts

By John S. Coulter, M. D.

Education in Physical Therapy in U. S. A. Sir Leonard Erskine Hill in Sec. Current Comment, Brit. J. Actinotherapy, p. 62, July, 1930.

The medical profession in America seems to be much exercised at present about the training in physiotherapy both of medical men and of lay assistants (called in America "technicians"). As in England, the demand for this form of treatment is greater than the supply, so that the Countil on Physical Therapy of the American Medical Association has stepped in and formulated (1) a scheme of training both for medical men and lay assistants. Although the Council realizes that their scheme "falls far short of the ideal," most people who read it will consider that it makes a very good start, and that the Council are distinctly modest in their estimate of their own work. Now that the subject of training in physiotherapeutics is coming more to the forefront in Britain, some consideration might well be given to the American scheme.

Under "Medical Education" the Council starts very properly with pre-medical studies, or what we here call the preparation for "preliminary scientific" examination. It is insisted that physics should be taught with a view to the use to be made of the knowledge later in the field of medicine. In America, as in England, the medical cirriculum has been over-crowded; if the students of the future are not to become mental wrecks, all superfluous subjects must be jettisoned, and those it is decided to keep must be trimmed and pruned to suit requirements. To delve deeply into physics presupposes a considerable knowledge of mathematics, but the large majority of medical men never get beyond an elementary knowledge of these, and, indeed, it is hardly necessary, since an excellent working knowledge of physics is quite attainable provided the student has mastered the technique of equations necessary to the understanding of formulae. Medical men who have some idea of specializing later in physiotherapy will find ample opportunity for acquiring extra knowledge when it comes to graduate and post graduate courses; by the time these stages are reached natural selection and the elimination of examinations will have done their deadly work, and the survivors will naturally pass on without trouble to the higher stages of physics. The same applies to the sister subject of chemistry. Profound knowledge in these preliminary sciences is not necessary; but what is required should be thoroughly sound so far as it goes.

Another point stressed in the American plan is that the reforms suggested should be introduced gradually. This is important, since sudden changes and revolutions upset the medical curriculum, which is the result of gradual growth and evolution. The idea of starting postgraduate courses to be put into practice at once is excellent, and should certainly be copied here.

In the section of the Council's report dealing with the training of technicians, outlines of two courses of training are given. The first is a course of nine months (1,200 hours) for "physical therapy technicians." The second is an advanced course extending over two years, and is intended for "occupational therapy technicians." The latter would appear to create a special class of technicians of which we have no equivalent here, and it is doubtful whether it would be possible, or even advisable to introduce it into England. But the course for "physical therapy technicians" is excellent. It visualizes physiotherapy as one whole, and would turn out assistants with a better all-round training than our "B. P. A.'s," since it includes electrotherapy, massage and corrective exercises, hydrotherapy and mechanotherapy in the one course.

One important question touched on—and one which, sooner or later, will have to be faced here—is whether the medical training should be given by one instructor or professor, or whether someone "may be designated to act as a coordinator of a course in which special lectures from the other departments of the school demonstrate the use of physical measures in their departments." For undergraduates the former alternative will probably be best—but for postgraduate and specialistic courses no doubt the latter will recommend itself. Possibly the solution will be the appointment of a professor of physiotherapeutics who will give a complete course for undergraduates and coordinate the course for post-graduates.

An Analysis of 100 Consecutive Cases of Back Strain. Myron O. Henry, M. D., F. A. C. S., Minneapolis, in Minnesota Med., p. 572, August, 1930.

Physiotherapy was employed in all of these cases either by the patient himself or a trained physiotherapist. Local heat, either by electric pad, radiant light, or hot packs was usually applied. Baking and massage was given in many cases, but none of this series happened to receive diathermia. We believe diathermia of great value in acute strains of all sorts, and find it is of great value for relief of pain in such cases.

Rest alone (or supplemented by no other treatment than adhesive strappings) was used in 6 per cent of these cases. By this is meant absolute rest in bed, usually with pillows supporting the knees to relax the hamstring muscles. All of these patients, however, were instructed to avoid bending, stooping and lifting during the period of treatment, and usually were cautioned to avoid the jolting of vehicles.

Foreign protein injections were employed in 2 per cent of the cases. This is done in those special cases where the arthritic habitus of the patient seems to warrant such treatment.

Correction of short leg was used in 2 per cent of the cases. The correction employed is a one-half inch lift on the outside heel of the shoe.

Postural correction was given in 12 per cent of the series.

Braces were used in 61 per cent of these cases. The type of brace varied from the leather sacro-iliac belt having perineal straps, to the "Osgood," or "Butterfly," brace having auxiliary crutches to take the weight on the iliac crests. The brace most frequently used was the spring steel brace of the "Boston" or Goldthwait type.

Plaster of paris jackets for more complete and certain immobilization, were employed in 8 per cent of these cases.

Manipulation under anesthesia was used in 10 per cent of these cases. We attempt to carry the spine through the normal range of motion with the muscle spasm relaxed by anesthesia. The straight leg raiding of Baer is used to flex the pelvis on the spine. This is not an exact method of treatment, but we have had no untoward results, and some brilliant results.

The operation of spinal fusion was done in 4 per cent of these cases.

Notes on the Treatment of Juvenile Rheumatism. N. Gray Hill, M. B., in Brit. J. Child, Dis., June, 1930, p. 81.

There is still much doubt as to the influence on the body of irradiation with light and ultra violet rays, but there would seem to be a consensus of opinion that it tends to raise the available calcium of the tissue fluids. During the summer months the rheumatic children are freely exposed to the natural sunlight, clothing being reduced to the very minimum, and just the customary precautions taken to prevent actual sunburn or too prolonged exposure to the hot midday sun. Most of the patients pigment well, but their skin reactions seem to be very much as those of the patients admitted with surgical tuberculosis and other diseases in no way connected with juvenile rheumatism, and all degrees of pigmentation are obtained. During the winter months artificial heliotherapy is employed, but only to a limited extent, as only those patients who are allowed to be out of bed are treated.

Up to the present no specific treatment has been found, but there are indications that "calcium therapy" may prove of real value, and it would seem to be essential that closer and more searching biochemical investigations of the rheumatic patient should be carried out so that clinical findings may be checked and aided by more exact research.

The Local Paraffin Treatment of Rheumatic Diseases. Arnold Zimmer, M. D., (Chief of the Rheumatism Dep't., University Surgical Clinic, Berlin) in Brit. J. Actino., p. 185, August, 1930.

One of the principal physical methods is that of producing hyperaemia by heat applications. Barthe de Sandfort was the first to call attention to the valuable properties of paraffin. Its specific heat is very low and it is a poor conductor. It can be applied to the skin extremely hot without undue irritation of the thermo-regulatory nervous system and it heats the affected organ thoroughly for a considerable length of time. Its neutral point is about 40 degrees centigrade higher than that of water, which permits of the deep seated action required in the treatment of joints or muscles. The high latent heat of fusion of paraffin, 39 g/kal., is another important factor, as this is passed on to the skin, unlike other media which can pass on only the heat dissipated on cooling.

The paraffin may be applied in various ways, by pouring on, brushing or spraying.

We treat affected joints by a special form of local paraffin baths, using rubber holders made to fit the joint.

In order to avoid dissipation of heat, the pack is wrapped up in wool.

The solid paraffin is heated in a double boiler to about 90 degrees C. The liquid paraffin is then cooled off to 52—54 degrees C. as measured by a thermometer and poured into the paratherm, filling it up to the brim so that the joint is surrounded by hot paraffin on all sides.

Given a good wrapping of wool, the paraffin will take 4—5 hours to cool to body temperature, hardening slowly. The pack should be left on for 3—4 hours, certainly not less than 2.

The Use of the Diathermy Current In Eye Diseases. Philip Figdor, M. B., St. Johns Hospital, Lewisham, England, in Brit. J. Ophth., p. 405, August, 1930.

Eye diathermy was first employed by Iredell and Meadows Ryley primarily for the relief of pain in a case of glaucoma (Proc. Royal Soc. of Medicine, 1918). The man was already completely blind and was admitted to the hospital for removal of the eye because he could no longer bear the pain. As he was already blind and no worse could befall him, diathermy was applied, with complete relief of the pain and the saving of the eye.

I was successful in developing a new diathermy eye applicator (Brit. N. J. I, 1927) which makes the treatment safe in skilled hands and with a trained assistant.

Pain in the eye from whatever cause in any chronic eye disease, is relieved by diathermy. That statement is made deliberately and without qualification. Some patients have volunteered the opinion that they have had a good night's sleep after two or three treatments, occasionally after the first.

Chronic senile conjunctivitis does well. Iridocyclitis and cyclitis vary in their results. I can say definitely, however, that the majority do well. In glaucoma the tension is appreciably lessened after each treatment, at least temporarily. In two cases it appeared to me that the condition was arrested.

Chronic infections of the eye lids, do very well, particularly chronic blepharitis.

In cataract there would appear to be scope for diathermy if this disease is in part due to a nutritional defect from whatever cause.

The Beneficial Effects of Bathing. Guy Hinsdale in Med. J. & Rec., p. 157, Aug. 20, 1930.

Data in respect to the absorption of sulphur were obtained in 16 patients who presented pathological lesions of the skin and in 2 who had no skin disease and who served as controls. Three types of baths were used. There were four cases in which special precaution was taken to prevent absorption of sulphur dioxide by the respiratory tract. These patients wore gas masks, the inlet and outlet tubes of which projected through the aperature in the window.

The result of these baths was that there was a marked rise in concentration of sulphur in the blood. They show that when a bath is prepared in such a way that sulphur dioxide is evolved, a considerable amount is absorbed in the blood.

One is always at a loss to attribute to any one measure its relative value when various therapeutic agents are combined in the treatment of a given case.

Schamberg and Tseng concluded from their study:

That these very hot baths cause a transient leucocytosis, followed by a brief reduction in the white cells.

A slight rise in systolic blood pressure and frequently a great drop in the diastolic pressure, both of temporary duration.

A fall in the blood cholesterol averaging about 10 per cent.

A rise in the blood sugar averaging about 10 per cent.

No material influence upon urea nitrogen, blood uric acid or proteolytic or lipolytic enzymes.

A hopeful frame of mind, sustained by encouragement all through the course of treatment, is a prime requisite. The Romans recognized this as one may see in the ruins of the baths of Caracalla:

"Light of heart approach the shrine of health
So shalt thou leave with body free of pain
For here is no cure
For him who is full of care."

Aromatic and resinous substances in the bath probably have some value as a nerve sedative independent of their psychological effect. They appeal to the senses in an agreeable manner and have a visible effect in producing surface hyperemia.

In the order of skin stimulation I might place them as follows, beginning with the weaker:

Pine needle extract; lacpinin; Bing's pine needle bath; Porozon; Fluorin; Transkutan.

The best and most recent study of sweat has been made by Pemberton, Cajori and Crouter, who have analyzed sweat from a variety of patients, especially those suffering from arthritis, nephritis, soleroderma and psoriasis. (Pemberton, Cajori and Crouther: Annals of Internal Medicine, June, 1929.)

They found that the initial sweat was usually more acid than that which is secreted later, if conditions favorable for sweating are maintained. This change in reaction seemed to be a compensatory measure to the systematic alkalosis which develops during a "bake," hot bath, or other systematic exposure of the body to external heat.

The beneficial effects of bathing are, therefore, due to the mechanical removal of extraneous substances from the skin; in other words, supercleanliness. The effect of heat on the blood and the production of enurovascular exercise is to promote elasticity of the bloodvessels and their power to "react," bringing to stagnant or inactive organs new blood.

The Irritable Colon. R. J. Condry, M. D., Elkins, W. Va., in West Virginia, M. J., p. 464, August, 1930.

The treatment of the irritable colon is quite simple. The first step is the absolute withdrawal of all cathartics, enemas, and irrigations. The diet should be simple. When the diet becomes too constipating, mineral oil and psylla seeds are indicated. Drugs in the form of belladonna and sedatives tend to correct the overactivity and the imbalance of the autonomic nervous system. Where gastric anacidity exists, dilute hydrochloric acid is indicated. Rest after meals and the application of heat to the abdomen are very beneficial as an adjunct to the other measures named.

Visceroptosis: Its Clinical Significance and Treatment. Edward L. Bortz, M. D., The Lankenau Hospital Medical Clinic, Philadelphia, in Am. J. M. Sc., p. 59: July, 1930.

Hygienic measures including complete elimination through the bowels, kidneys, skin and lungs with rest of 10 or 12 hours at night; 2 hours in the afternoon, and 45 minutes lying on the left side after each meal to facilitate digestion and rest the mesenteries, are important. We prescribe a vigorous general massage twice daily using cocoa butter or oil of wintergreen.

Exercise directed to increasing the strength of the abdominal muscles, and at the same time to raise the sunken chest and augment the diaphragmatic excursion are advised twice a day.

Foci of infection located usually in the teeth, tonsils, nares, sinuses or pelvic tract are cleared up. Diet is of primary importance.

The Dosage of Ultraviolet Radiation In Infants With Tetany. Harry Bakwin, M. D., and Ruth Morris Bakwin, M. D., New York, in Jour. A. M. A., p. 396, Aug. 9, 1930.

In the use of ultraviolet radiation for infants with tetany, there is an optional range of dosage above which and below which the rate of rise in the serum calcium is slowed. A daily dosage of two minutes front and two minutes back at 50 cm. is optimal unless the burner is badly deteriorated.

When large enough doses of ultraviolet radiation are used, the average daily rate of rise in the serum calcium of white and of negro infants with tetany is about the same, but the minimal dosage necessary for cure is greater in negro than in white infants.

The Development and Effect of Deep-Seated Heat in the Female Pelvis. (A new diathermy technic.) G. D. Royston, M. D., F. H. Ewerhardt, M. D., et al in Jour. Missouri M. A., p. 327, July, 1930.

Definite evidence that no case was made worse during treatment; that is, no chronic process became acute, as shown by Schilling hemogram.

The Zener cervicovaginal electrode and technic as described will result in temperatures in the cervical canal averaging 111 degrees F., urethra 108 degrees, rectum 108 degrees, with extreme high temperatures of 115, 112 and 110 degrees respectively.

It is impossible to maintain this degree of heat for a period of over five to eight minutes, due to the dissipation of heat by the blood stream.

Symptomatically, all patients were improved. If temperatures above 113 degrees (cervical temperature) are used, the patient invariably complains of feeling worse, increase in pelvic pain following treatment and increase in tenderness, etc.

The work with this new Zener electrode is too recent as yet for us to report any clinical results. Of our 15 cooperating patients who have received four or more treatments, increased mobility of the uterus has been definitely determined in all.

Spinal Curvatures and Treatment by Corrective Measures. August Nils Anderson, M. D., Belvidere, Neb., in Nebraska State M. J., p. 321, August, 1930.

The author gives briefly a few general exercises that can be given at home under the direction of the physician or in his office, namely:

1. Standing Double Arm Heaving: It is done with the patient standing erect as in military fashion. The arms well stretched are carried forward, upward, with hands separated from each other while the palms of the hands are turned toward each other, when the arms are fully stretched upward they are carried straight out and downward in which the palms are turned upward until the hands come into a horizontal plane when they are twisted so that the palms are turned downward, this movement is an excellent respiratory movement and should be done very slowly; a deep inspiration is taken during the heaving and a deep expiration when hands are lowered.

2. Stretched Standing: With arms straight, stretched above head, gradually bending the spine, forward and

backward, also sideways. Each one of these movements is done five to eight times.

3. Have Patient Place Hands On Hips: And a torsion or twisting movement is gone through with, slow and even, from side to side, from five to six times.

4. Hands On Hips: Then trunk flexion backwards, also trunk flexion forwards, each six or eight times.

5. Head Flexion Forward and Backward: Head rolling, head bending from side to side, and head twisting; these movements should be gone through with slowly so as not to cause giddiness.

6. Horizontal Balance: Let patient stand on one foot, the other leg straight back, hands stretched above head, alternate and stand on other foot.

7. Body Rolling or Circling: Three to eight times, each way, with hands on hips and feet apart, bend the trunk forward then to the left side then backward, then to the right and forward, repeat to the right.

8. Place Patient on Couch or Floor: With face down and hands on hips, then trunk raised backward. This is a very good movement for double curvature of the spine, as all the muscles of the back, hip joint extensors and abductors of the scapulae are vigorously contracted; it is also very effective for round shoulders and narrow chest.

9. Patient Lying on Back: First, pull both knees up toward the chest as high as possible, then straighten the legs up and lower them slowly to 45 degrees, when they should be bent with the feet resting on the couch. This will prevent the execssive lumbar anterior curve, and should be given frequently in cases of lordosis.

Tuberculosis in Childhood. M. D. Jacoby, M. D., Detroit, Mich., in Jour. Michigan State M. S., p. 558, August, 1930.

The treatment of a child with tuberculosis is much like that of an adult, always remembering that we are dealing with a child. He needs a regime, hygiene, and diet quite different from that of adults in health as well as disease. We should keep certain principles definitely in mind. If there is activity (fever, no gain in weight, etc.,) rest in bed is essential, with proper feeding, air, light, etc. If a child has no fever and is gaining and growing well, his disease is probably latent and he needs merely the care and regime of a normal child plus a little extra care. He should be protected especially from excessive fatigue, and rest after lunch is essential. Cod-liver oil is certainly indicated. Every effort should be made to keep up the nutrition, which is our best guide to resistance. The weight curve must be watched just as carefully as the temperature curve in a child known to be infected, as activity is thereby suspected. Ultra-violet light is indicated if the site of lesion is in the glands and should not be used when the parenchyma of the lungs are involved.

Tuberculosis of Female Pelvis. Abstract in Jour. A. M. A., p. 622, Aug. 23, 1930, from Amer. Rev. Tuberc., p. 72, July, 1930.

Jameson asserts that tuberculosis pelvic disease occurs in about 8 per cent of women with pulmonary tuberculosis. The diagnosis can be made with a reasonable degree of certainty on the history, symptoms and observations on careful pelvic and abdominal examination. The roentgen rays seem to offer a feasible conservative method of treating tuberculosis lesions of the uterus and adnexa in women with pulmonary tuberculosis. In patients too sick for even this method of treatment, conservative treatment with hot douches, baking and general medical measures offers relief in a majority of cases. Surgery should be restricted to patients not relieved by other methods.

The Mode of Action of Heliotherapy. Abst. from London Letter June 14, 1930, to Jour. A. M. A., p. 138, July 12, 1930.

At the Congress of the Royal Institute of Public Health, Sir Henry Gauvain, the pioneer in this country in the use of heliotherapy in surgical tuberculosis gave a new view of this treatment. He said that some were inclined to doubt its value in England because of the high proportion of cloudy and misty days. They suggested a sunny climate where insolation might be practiced the whole day. But tuberculosis is endemic in Switzerland, the European country most extolled for heliotherapy. So prevalent is the disease that a special sanatorium has been erected for university students. Even the native experts admitted that to obtain a cure the patient must leave for less sunny plains. Again, tuberculosis is one of the most serious scourges of Egypt and India. The claim that heliotherapy would cure all forms of surgical tuberculosis is wrong. Why are the results so variable? The treatment is more effective in the constantly changing conditions, not merely solar, found in temperate climates, than in the comparatively stable conditions of tropical regions.

Individuals vary in their response to light, and in the same individual there is a variation both seasonal and daily. The greatest seasonal response is in the late spring and early summer, and that occurs in both the animal and the vegetable world. As the summer advances the response becomes less vigorous, though the intensity of the light increases. The greatest response is after a period when the patient has received minimal stimulation. A patient kept in the country for light treatment may rapidly improve during the early summer, but there comes a period when further response cannot be obtained except by a change of locality, such as transfer to the seaside, where there is a new type of stimulus. The basal metabolism is enormously increased by the combined effect of the light bath, the cool sea breeze, sea bathing, spraying and paddling. Progress again becomes rapid, provided stimulation is not pressed beyond the capacity to respond. Thus the benefits of insolation are due not so much to the intensity of the light as to the shock of varying stimuli eliciting favorable responses. There is also a diurnal variation in response. It has long been recognized that morning light has the greatest therapeutic value, and yet it is less intense than the light of the midday sun. This variation in response is due to the fact the light shock evokes a greater response immediately following antecedent darkness. Thus, paradoxical as it might appear, darkness is as essential for heliotherapy as light. Continuous exposure to sunlight in summer would not produce beneficial results as speedily as alternations of light and shade, heat and cold, humid and dry air. Even the onset of a week of rainy, cloudy weather might be of considerable advantage in the sun cure in hot summer. Thus the changeability of the English climate is a great advantage.

The average Englishman is at least physically as fit as, probably fitter than, the inhabitant of almost any other country. Individual powers of response vary enormously. A strong adolescent, with good reacting powers, who tans easily, can stand intense sunlight with advantage, and revels in it. He is benefited, while a weak person with feeble powers of response, might suffer irremediable harm. Indeed very ill people or animals might instinctively desire and benefit by darkness.

The progress of a patient does not depend on the extent or activity or nature of the lesion but on the power of response. Very young children, elderly people, and those seriously ill, rapidly become exhausted and are unable to respond to the excessive stimulation they might be called on to receive.

The Treatment of Laryngeal Tuberculosis with Artificial Sunlight. Joseph W. Miller, M. D., F. A. C. S., New York, in New York State J. M., p. 844, July 15, 1930.

The plan was to imitate the blue end of the sun spectrum as closely as possible, by an arclight burning with specially constructed and impregnated carbons according to the Goerz system, by which the greatest concentration of rays is thrown to one side and made to converge into a cone through the medium of a quartz optic. In other words, this machine is a carbon arclight water cooled quartz lamp.

Of the 74 cases treated, only two did not respond to radiation. Of the other 72 patients, 59 showed complete healing of laryngeal lesions with no subjective symptoms referable to the larynx. The other 13 cases, while improving from their subjective laryngeal symptoms, demonstrated either partial or no healing of the tuberculous larynx.

Ultraviolet Rays in Treatment of Alopecia Areata. Abst. in Jour. A. M. A., 95:4:304, July 26, 1930, from Gazz. d. osp., P. 426, April 6, 1930.

Narducci reports the results secured from the use of ultraviolet rays in the treatment of 25 cases of alopecia areata. In 17 cases a complete cure was effected after from 16 to 35 exposures. Four cases (16 per cent) showed no improvement after from 10 to 35 irradiations. In one case the bald spots that existed at the beginning of treatment became covered with a new growth of hair after a number of irradiations, but two new bald spots developed that were not influenced by a continuation of the treatment. In one case the treatment was interrupted after marked improvement. In two cases the treatment was soon given up (after seven or eight irradiations) without any improvement. Twelve of the patients had only one bald spot, while six had two bald spots. Of the four cases that showed no improvement, one presented multiple bald spots, one three bald spots, one two bald spots, and only one had a single bald spot. The author does not wish to contend that general ultraviolet irradiations constitute a specific or even the best means of treating alopecia areata, but that they deserve to be kept in mind in cases in which other methods fail, and are always a good adjuvant in convalescents, along with other local and general treatment.

Glasses for Protecting the Eye from Glare. W. W. Coblentz, Ph.D., D.Sc., Washington, D. C., in Jour. A. M. A., p. 593, Aug. 23, 1930.

In conclusion it is to be emphasized that when near ultraviolet ray lamps and sparks from induction coils, dark glasses should be worn to protect the eye from ultraviolet radiation. Unlike the sun, these artificial sources are in the direct line of vision and unavoidably shine into the eyes.

Physical Therapy in Dermatology. Carroll S. Wright, M. D., Philadelphia, in Panna. M. J., p. 721, August, 1930.

The Finsen light is the best apparatus devised for the treatment of tuberculosis of the skin and remarkable results are being reported by Reyn at the Finsen Institute. Reyn prefers the carbon arc light because its spectrum more nearly approaches that of sunlight.

Although a marked exfoliation can be produced by either the Kromayer or Alpine light in the treatment of acne vulgaris, the results are neither as definite nor as lasting as those obtained when x-rays are employed.

That the ultraviolet rays hasten the return of hair in alopecia areata is generally agreed. Louste and Jouster obtained the best results from the use of the pressure lens. Very few dermatologists have any faith in the ability of the ultraviolet rays to promote hair growth in cases of premature alopecia, although in cases of defluvium following illness the rays may have a marked restorative action. Goeckerman's special technic is sometimes effective. It consists in a nightly rubbing of the patches with crude coal tar ointment, removal of the ointment with oil the following day, and then application of the ultraviolet rays.

One of the greatest benefits conferred by the ultra violet rays is their tonic action. They may be used in this way with happy results in the treatment of certain dermatoses in which improvement in the general condition of the patient is necessary to bring about a cure.

The bipolar current is particularly valuable, but one should spend considerable time learning how to guage its action. The bipolar current may be successfully employed in the treatment of such varied conditions as spider nevi, juvenile warts, verruca vulgaris, acne pustules, small steatomata, mucoceles, telangiectasis, molluscum contagiosum, nevus verrucosus, adenoma sebaceum, etc. It is my opinion that the lesion produced by the bipolar current is less painful and heals more rapidly than that produced by monopolar current. The bipolar current used for the radio knife is particularly useful in removing deep-seated growths such as large epitheliomas, but careful control over the cutting point is requisite.

Diathermy is also useful. Leszynski reports excellent results from diathermy of the thymus in 7 or 8 cases of psoriasis and considered it a much better method of stimulating the thymus than roentgen ray therapy. Hunter was able to cause a cessation of furuncles in the auditory canals, after they had recurred for three years, by the application of diathermy to the ears.

The galvanic current may be applied either direct or indirect. Jeanselme, Bourguignon and Lucas used the direct method in the treatment of scleroderma, placing the negative electrode soaked in a one per cent solution of potassium iodide on the lesion and a positive electrode soaked in water near and passing current through the patch.

For removing superfluous hair electrolysis is still the treatment par excellence.

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